ROBERTS GORDON

ROBERTS GORDON®

BZC 100 CONTROLLER

Installation Manual

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can result in death, injury or property damage. Read the installation and operation manuals thoroughly before installing or servicing this equipment.

Installation must be done by a electrician qualified in the installation and service of control systems for heating equipment.

Installer

Please take the time to read and understand these instructions prior to any installation. Installer must give a copy of this manual to the owner.

Owner

Keep this manual in a safe place to provide your serviceman with information should it become necessary.

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10011601NA Original 08/00

▶TABLE OF CONTENTS

1. Introduction

1.1 What is a ROBERTS GORDON® BZC Controller? 1
1.2 General Requirements 1
1.3 Check Installation Materials 1
1.4 Safety 1
1.5 Example Site Layout 2
1.6 Internal Connection Information 3
1.7 How to Read the Configuration Sheet 4
1.8 Example Layout Wiring Information 5
1.9 ROBERTS GORDON® BZC 100 Configuration 6

2. Specifications 7

2.1 Material Specification 7
2.2 Electrical Specification 7
2.3 Pump Starter Specification 7
2.4 Outside Air Supply Blower 7
2.5 Burner Electrical Ratings 7
2.6 Keypad Layout 7

3. Installation 8

3.1 Preparation 8
3.2 Installing the ROBERTS GORDON® BZC 100 Controller 8
3.3 Electrical Installation Requirements 9

4. Typical External Diagrams 12

4.1 GORDONRAY® BH, CARIBE® and VANTAGE® TF Unitary Heaters 12
4.2 VANTAGE® II and VANTAGE® HE Unitary Heaters Load Relay 13
4.3 Unitary Heaters Load Relay 12V DC Coil 14
4.4 GORDONRAY® DF Unitary Heaters 15
4.5 VANTAGE® EV System 16
4.6 CORAYVAC® System 17
4.7 EP 100 and EP 201 1ph Pump Connection (12V DC Coil) 18
4.8 EP 301 1ph Pump Connection (120V AC Coil) 19
4.9 EP 301 1ph Pump Connection (12V DC Coil) 20
4.10 EP 203 and EP 303 3ph Pump Connection (120V AC Coil) 21
4.11 EP 203 and EP 303 3ph Pump Connection (12V DC Coil) 22
4.12 1ph Pump Connection with Outside Air Blower 23
4.13 1ph Pump Connection with Outside Air Blower (12V DC Coil) 24

5. Alarm Signal Condition Monitoring 25

5.1 Pump Trip Indication 3ph 25
5.2 Pump Trip Indication 1ph 26
5.3 Burner Lockout Indication 27
5.4 Building Management Systems Remote Time Enable 28
5.5 Fire Safety Shut Off Facility 29

6. Engineer's Set Up 30

6.1 Correcting Wrong Entries 30
6.2 Time and Date Set Up 30
6.3 Control Settings 31
6.4 Zone Time and Temperature Settings 32
6.5 How to Check the Configuration 34

7. Troubleshooting 35

7.1 Display Problems 35
7.2 Sensor Problems 35
7.3 Unitary Burners 36
7.4 Variations for VANTAGE® EV Systems . . .36
7.5 CORAYVAC® Systems 37
7.6 Screen Displays 37

8. Replacement Parts 38

8.1 Component List 38
8.2 Replacement Parts Instructions 39

9. The ROBERTS GORDON® BZC 100 Controller Warranty 43

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▶TABLE OF FIGURES

Figure 1 Example Site Layout Drawing 2
Figure 2 Internal Connection Diagram 3
Figure 3 Example Configuration Table 4
Figure 4 Example External Wiring Diagram 5
Figure 5 Keypad Layout 7
Figure 6 ROBERTS GORDON® BZC 100 Cover Detail . .8
Figure 7 Mounting Hole Layout 8
Figure 8 Separator Plate Detail 8
Figure 9 Separator Plate Removal Detail 9
Figure 10 Shielded Cable Detail 11
Figure 11 Sensor Cover Assembly 11
Figure 12 Mounting Assembly 11
Figure 13 GORDONRAY® BH, CARIBE® and VANTAGE® TF Unitary External Wiring Diagram 12
Figure 14 VANTAGE® II and HE Unitary External Wiring Diagram 13
Figure 15 Alternate Unitary External Wiring Diagram (12V DC Switching) 14
Figure 16 GORDONRAY® DF External Wiring Diagram 15
Figure 17 VANTAGE® EV External Wiring Diagram 16
Figure 18 CORAYVAC® External Wiring Diagram 17
Figure 19 EP 100 and EP 201 1ph External Wiring (12V DC Switching) 18
Figure 20 EP 301 Pump Contactor External Wiring Diagram 19
Figure 21 EP 301 Pump Contactor External Wiring Diagram (12V DC Switching) 20
Figure 22 3ph Pump Starter External Wiring Diagram 21
Figure 23 3ph Pump Starter External Wiring Diagram (12V DC Switching) 22
Figure 24 1ph Pump with Outside Air Blower External Wiring Diagram 23
Figure 25 1ph Pump with Outside Air Blower External Wiring (12V DC Switching) 24
Figure 26 3ph Pump Indication Trip External Wiring Diagram 25
Figure 27 1ph Pump Indication Trip External Wiring Diagram 26
Figure 28 Burner Lockout Indication External Wiring Diagram 27
Figure 29 BMS Time Enable External Wiring Diagram 28
Figure 30 Fire Safety Shut Off External Wiring Diagram 29
Figure 31 Display Troubleshooting Diagram 35
Figure 32 Sensor Troubleshooting Diagram 35
Figure 33 Unitary Troubleshooting Diagram 36
Figure 34 CORAYVAC® Troubleshooting Diagram 37
Figure 35 ROBERTS GORDON® BZC 100 Internal Components Diagram 38

▶SECTION 1: INTRODUCTION

1.1 WHAT IS A ROBERTS GORDON® BZC CONTROLLER?

The ROBERTS GORDON® BZC 100 is a micro processor based controller designed for the most efficient control of CORAYVAC®, VANTAGE®, GORDONRAY® and CARIBE® heaters.

This controller is capable of giving control outputs from 3 relays, 1 of which affords heating zone control capabilities. The controller also features 2 inputs which are used for signal condition monitoring.

1.2 GENERAL REQUIREMENTS

The ROBERTS GORDON® BZC series of controllers are supplied pre-configured for their application and only for the use with ROBERTS GORDON® infrared heating equipment. Failure to comply with the installation instructions and configuration may invalidate the limited warranty set out on *Page 43, Section 9.*

The controller, burners, pump and outside air blower must be electrically grounded in accordance with the *National Electrical Code® ANSI/NFPA* 70 - latest revision.

Before proceeding with the installation of the controller, it will be necessary to check the following points have been considered.

1.3 CHECK INSTALLATION MATERIALS

1.3.1 Switchable Loads

The controller relays are rated for switching loads no greater than 4.4A. Therefore, each zone must have a local relay with contacts rated for the applicable load if it exceeds 4.4A.

All pumps require the use of an external load switch, either a relay or contactor. See *Page 7, Section 2.3* to ensure the correct one is fitted for each motor rating.

The total added current load for all 3 relays must not exceed 20A.

1.3.2 Sensor Location

The sensor measures the air temperature in the building. It is important that the sensor is located in an area within the heated zone at occupant level. The sensor should be located in a position such that it is not shaded from the infrared heating.

1.3.3 Installation Materials

Shielded cable Belden 8451, General Cable C2514 or equivalent rated for up to 300V AC must be used for sensors and 12V DC inputs.

The sensors must be fastened using countersunk screws. Dome headed screws will short out the board and result in failure of the sensor.

1.3.4 Inputs

All inputs into the controller must be 12V DC. The supply is from the "+" terminal to be found on the board of the controller.

1.3.5 Programming Details

Every controller is programmed for the specific application. Use the site layout drawing to identify the heating zones indicated in the configuration on *Page 6, Section 1.9*.

1.4 SAFETY

Your Safety is Important to Us! This symbol is used throughout the manual to notify you of possible fire, electrical or burn hazards. Please pay special attention when reading and following the warnings in these sections.

⚠ WARNING

Installation, Service and Annual Inspection of controller must be done by an electrician qualified in the installation of control systems for heating equipment.

Installation, Service and Annual Inspection must be done by a contractor qualified in the installation and service of gas-fired heating equipment.

Read this manual carefully before installation, operation, or service of this equipment.

Failure to follow these instructions can result in death, injury or property damage.

For optimum heater performance and safe heating conditions, inspect and maintain heater(s) before every heating season and as necessary. Also, know and maintain heater clearances to combustibles, see heater Installation, Operation and Service manual for further details. If you require additional manuals, contact your ROBERTS GORDON® independent distributor or Roberts-Gordon at (716) 852-4400 or (800) 828-7450 in the U.S., (905) 945-5403 in Canada or at www.rg-inc.com.

IMPORTANT READ THIS FIRST!!!!

1.5 EXAMPLE SITE LAYOUT

It is essential to follow this section to understand how to use the information in this manual.

Please ensure that you understand this example before proceeding with the installation.

Shown below is an example layout for a building where a ROBERTS GORDON® BZC 100 Controller will be used to control the infrared heating system shown.

The layout consists of one zone of CORAYVAC® heaters.

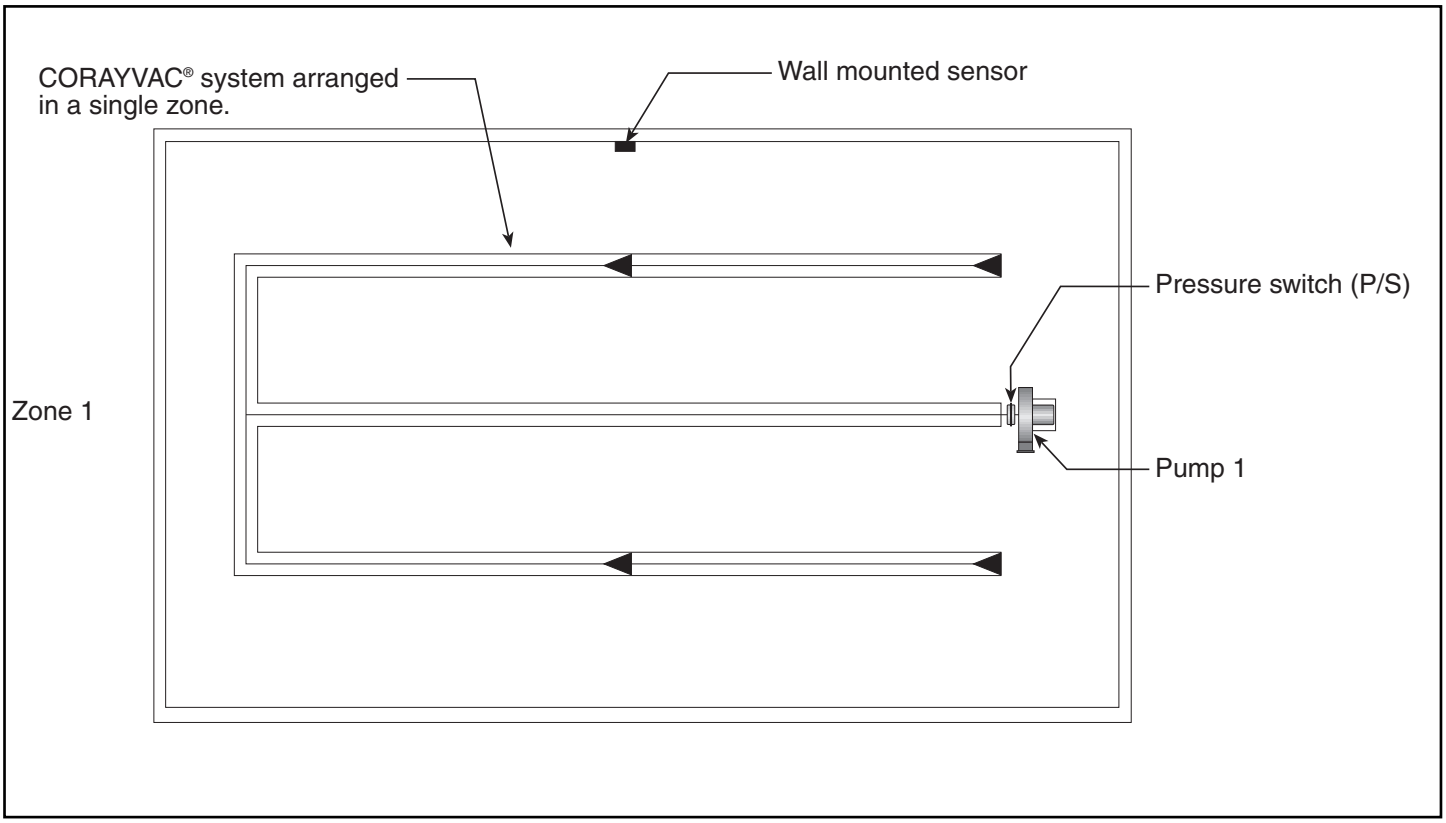


FIGURE 1 - Example Site Layout Drawing

1.6 INTERNAL CONNECTION INFORMATION

Below is a diagram showing the terminal layout within the controller.

The relay contacts and inputs are assigned functions through the configuration process. The controller needs to be configured for the individual application.

The following Section shows the configuration of relays and inputs for the example layout shown on *Page 2, Section 1.5, Figure 1*.

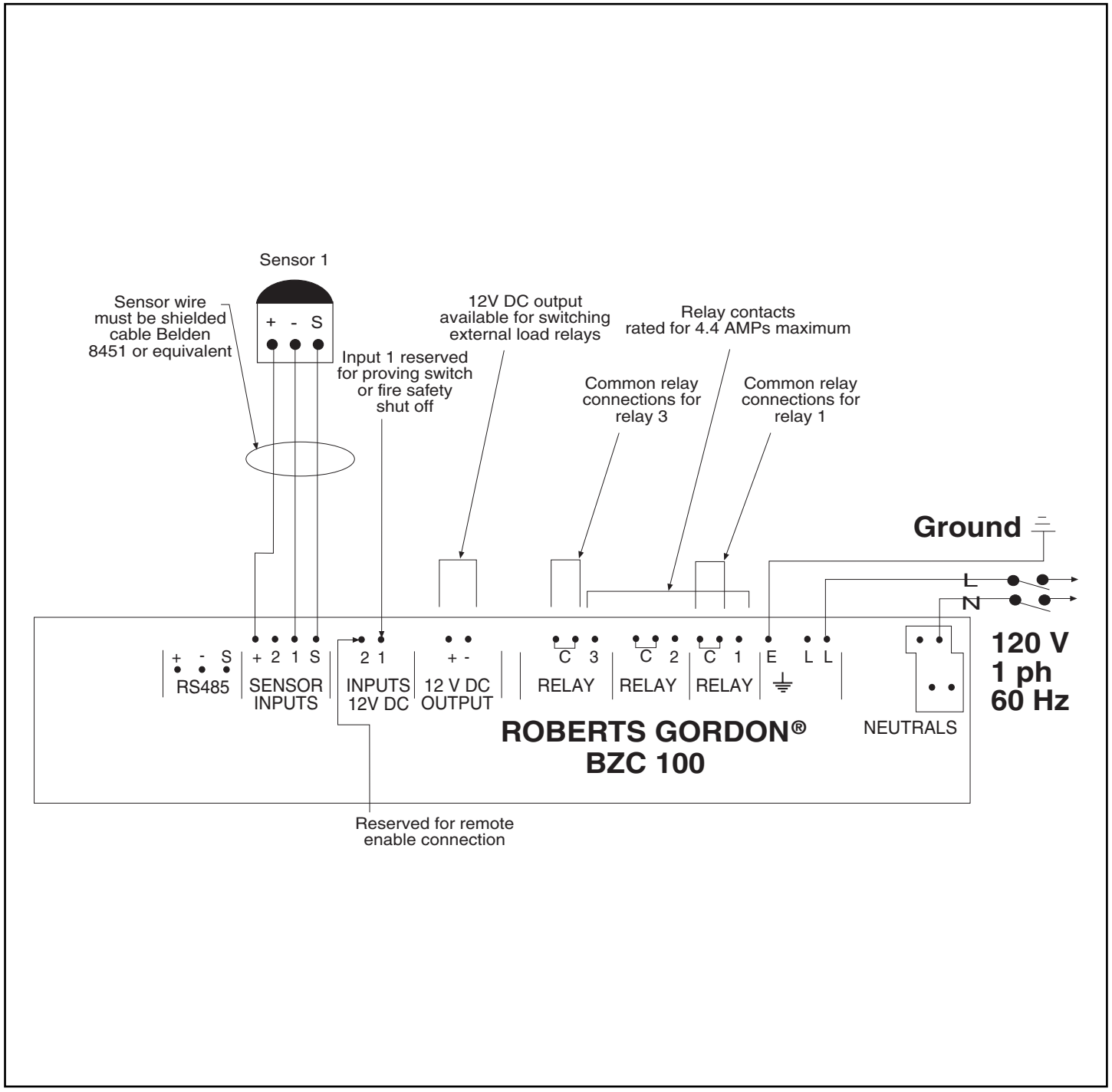


FIGURE 2 - Internal Connection Diagram

1.7 HOW TO READ THE CONFIGURATION SHEET

The tables shown on *Page 4, Section 1.7, Figure 3* represent the assignments of relays and inputs that would result from the configuration of the panel for the example site layout shown on *Page 2, Section 1.5, Figure 1*.

The outputs labeled RL1 through RL3 are the relay contacts shown on *Page 3, Section 1.6, Figure 2*.

For the example shown, the burners for Zone 1 will be connected to RL1. This is identified by the Zone number and the product description. The column labeled EXTERNAL RELAY Y/N, indicates whether the current draw exceeds 4.4A. If the current draw is greater, then a Y is indicated in this column, see *Page 13, Section 4.2* and *Page 14, Section 4.3* for specific wiring instruction for external relays.

In the example, the CORAYVAC® zone requires one output for the burners and one for the pump. The pump assigned to Zone 1 is connected via a load relay to RL2 (see *Page 5, Section 1.8, Figure 4*).

In the column labeled EXTERNAL RELAY Y/N there is a “Y” indicating that the load for the pump is greater than 4.4A. A load relay or contactor (1ph motors) or starter (3ph motors) must be provided to switch the load of the pump.

Input 1 is assigned for the pressure switch where input 1 will be connected to the pressure switch in Zone 1.

TABLE OF OUTPUTS

OUTPUT	ZONE NO.	PUMP NO.	PRODUCT	RELAY Y/N	SECTION NO.
RL1	1		CRV	N	4.4
RL2	1	1	CRV	Y	4.4
RL3					

TABLE OF INPUTS

INPUT	ZONE NO.	PUMP NO.	PRODUCT	SECTION NO.
1	1	1	P/S	4.4
2				

Figure 3 - Example Configuration Table

Key to product definitions

UNIT = GORDONRAY® BH Unitary Heater or
UNIT = CARIBE® Unitary Heater or
UNIT = VANTAGE® TF Unitary Heater or
UNIT = VANTAGE® II or HE Unitary Heater
HILO = GORDONRAY® DF Unitary Heater
C-FAN = VANTAGE® EV System
CRV = CORAYVAC® Continuous System

Key to input definitions

P/S = CORAYVAC® system pressure switch.

P/T = Pump trip for one zone (option available on input 1 only).

F/S = Fire safety shut off (option available on input 1 only).

BMS = Building Management System (option available on input 2 only).

1.8 EXAMPLE LAYOUT WIRING INFORMATION

The external wiring diagram shown below represents the external wiring required for the example site layout on *Page 2, Section 1.5, Figure 1*.

The information on the configuration tables for outputs and inputs determines the connection required. The product specific wiring arrangements are found starting on *Page 12, Section 4.*

For the external wiring shown below, see the typical CRV zone wiring diagram, *Page 17, Section 4.6*.

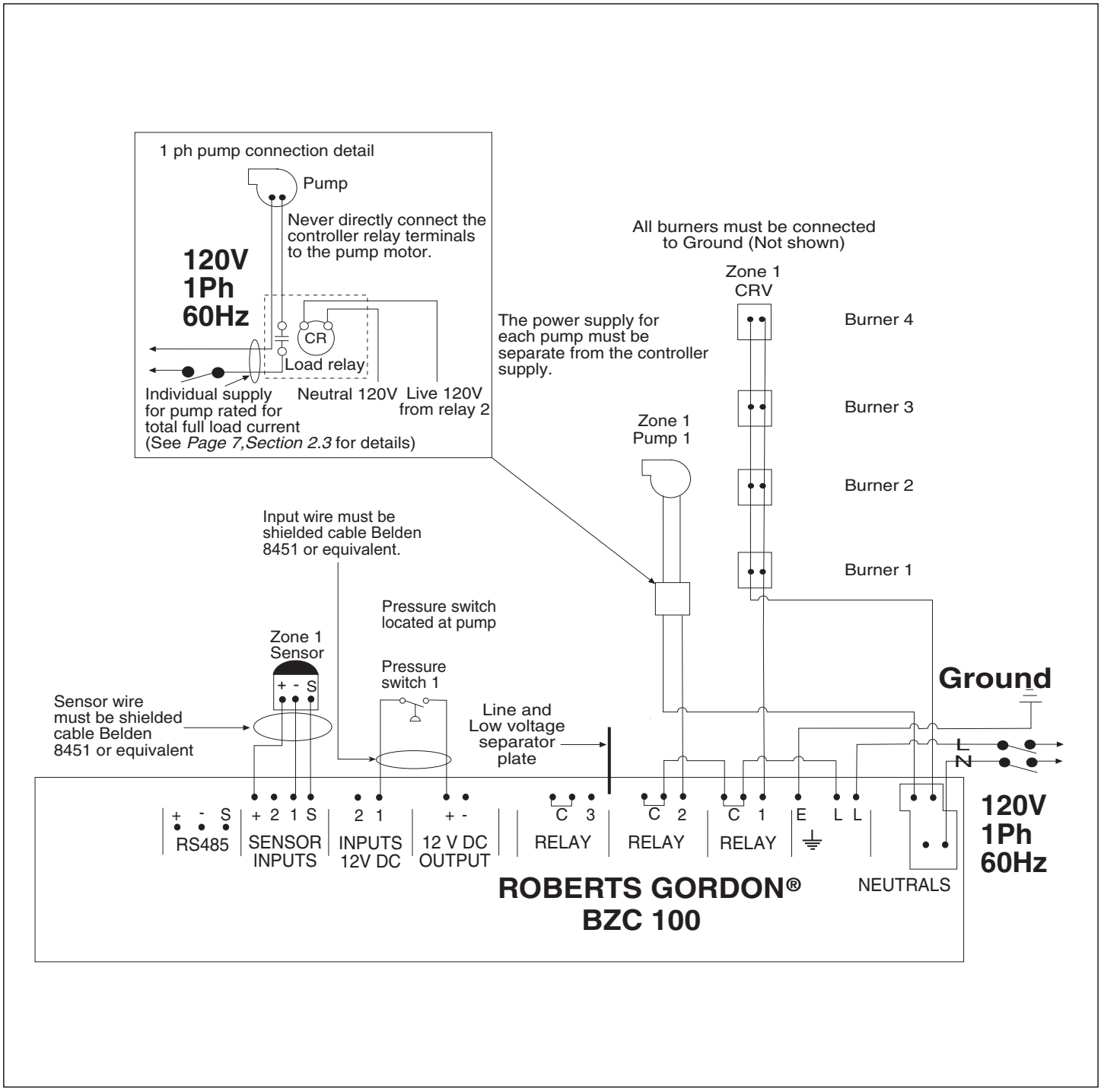


FIGURE 4 - Example External Wiring Diagram

1.9 ROBERTS GORDON® BZC 100 CONFIGURATION

Controller Serial Number _____
Project Name: _____
Roberts-Gordon Layout Drawing Number_____

Configured By: _____
Date: _____

TABLE OF OUTPUTS

OUTPUT	ZONE NO.	PUMP NO.	PRODUCT	RELAY Y/N	SECTION NO.
RL1					
RL2					
RL3					

TABLE OF INPUTS

INPUT	ZONE NO.	PUMP NO.	PRODUCT	SECTION NO.
1				
2				

1.9.1 Key to product definitions

UNIT = GORDONRAY® BH unitary heater
UNIT = VANTAGE® TF unitary heater
UNIT = CARIBE® unitary heater
UNIT = VANTAGE® II or HE unitary heater
HILO = GORDONRAY® DF unitary heater
C-FAN = VANTAGE® EV System
CRV = CORAYVAC® Continuous system

1.9.2 Key to input definitions

P/S = CORAYVAC® system pressure switch.
P/T = Pump trip indication for one zone (option available on input 1 only)
F/S = Fire safety shut off (option available on input 1 only).
BMS = Building Management System (option available on input 2 only).

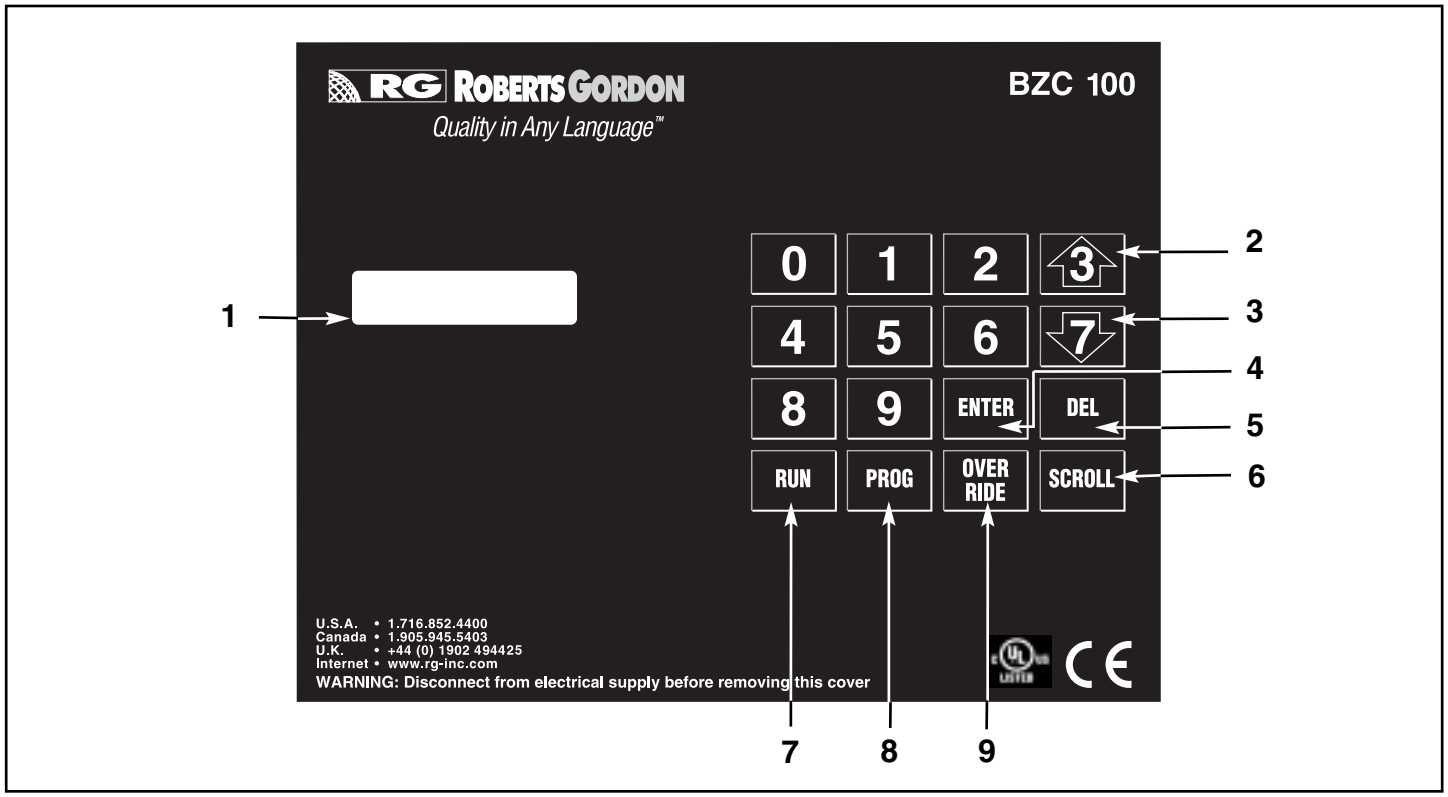


FIGURE 5 - Keypad Layout

▶SECTION 2: SPECIFICATIONS

2.1 MATERIAL SPECIFICATION

Enclosure Material:	ABS (UL 94-5VA Rated)
Weight:	3.5 lbs (1.6 Kg)
Dimensions:	7.8" x 2.4" x 11.4" 199 x 62 x 290mm
Protection:	Rating IP20

2.2 ELECTRICAL SPECIFICATION

Supply:	120 AC 1ph ± 10% 50/60Hz 20A
Relay Outputs:	Single pole 4.4A 120V AC. (resistive)
12V DC Inputs:	Only use shielded cable rated for up to 300V. (Belden 8451)
Sensors:	Only use ROBERTS GORDON® BZC sensors wired with shielded cable (Belden 8451)
Battery Back-up:	Lithium cell maintains data memory and time clock for 10 years minimum at 77°F (25°C)

2.3 PUMP STARTER SPECIFICATION

		Full load current	
		1ph	3ph
EP 100 Pump	1/3HP	4.8A	N/A
EP 201 Pump	3/4HP	6.6A	N/A
EP 203 Pump	3/4HP	N/A	3.0A
EP 301 Pump	1-1/2HP	16.0A	N/A
EP 303 Pump	1-1/2HP	N/A	4.2A

2.4 OUTSIDE AIR SUPPLY BLOWER

2.2A Start up (Full load current) at 120V, 60 Hz, 1ph
0.2A Run

2.5 BURNER ELECTRICAL RATINGS

GORDONRAY® BH	120V, 60Hz, 1ph 1A
GORDONRAY® DF	120V, 60Hz, 1ph 1A
CARIBE®	120V, 60Hz, 1ph 1A
VANTAGE® TF	120V, 60Hz, 1ph 1A
VANTAGE® II or HE	120V, 60Hz, 1ph 5A
VANTAGE® EV	120V, 60Hz, 1ph .2A
CORAYVAC®	120V, 60Hz, 1ph .2A

2.6 KEYPAD LAYOUT

1. LCD Readout
2. Increase Temperature Set Point
3. Decrease Temperature Set Point
4. Enter Information
5. Delete
6. Scroll Forward
7. Return to Run Mode
8. Enter Program Mode
9. Time Override a Zone

▶SECTION 3: INSTALLATION

Installation of the ROBERTS GORDON® BZC 100 Controller and the associated external electrical wiring must be done by an electrician qualified in the installation of control systems for heating equipment.

3.1 PREPARATION

Before installing the controller, observe the following:

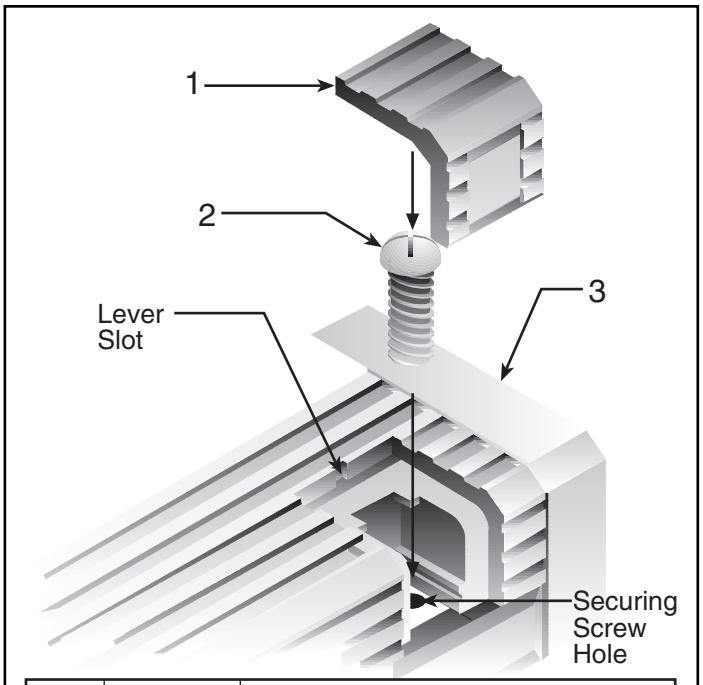
3.1.1 Ensure that you have a copy of the site layout for the project that clearly identifies the separate zones. See example on *Page 2, Section 1.5, Figure 1.*

3.2 INSTALLING THE ROBERTS GORDON® BZC 100 CONTROLLER

3.2.1 Choose a mounting location for the controller. Note that the maximum distance to any sensor is 1500' (450 m).

3.2.2 Remove the cover of the controller by removing the four securing screws.

See *Page 8, Section 3.2.2, Figure 6* for cover detail. Pry the clip (1) off using a flat blade screw driver in the groove (3). This will reveal the securing screw (2). Repeat this for each corner of the controller.



ITEM	P/N	DESCRIPTION
1	10000701	BZC CLIP COVER PLASTIC
2	10000700	BZC SCREW M3X22 PAN HD BZP
3	10010500	BZC 100 LID ASSY

FIGURE 6 - ROBERTS GORDON® BZC 100 Cover Detail

3.2.3 Disconnect the ribbon cable from the controller PCB board. Place the cover and the hardware in a safe place for refitting after the external wiring connections have been made.

3.2.4 Position the controller.

Page 8, Section 3.2.4, Figure 7 shows the mounting hole locations.

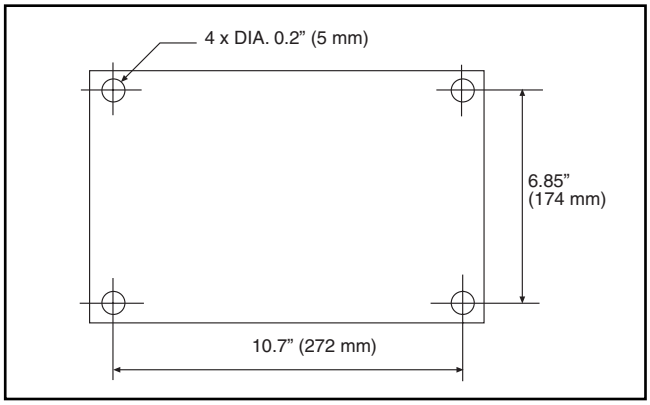


FIGURE 7 - Mounting Hole Layout

3.2.5 Remove the knockouts in the cable entry plate required for the conduit entry into the controller.

3.2.6 Fit the cable entry plate, provided with the controller, in the slot at the top of the panel.

3.2.7 Affix the Quick Start Programming Guide P/N 10001600 to the wall adjacent to the panel.

3.2.8 Use the configuration sheet (*Page 6, Section 1.9*) to identify the electrical terminal connections to be made. If unsure, refer to *Pages 2-5, Sections 1.5 to 1.8,* for worked example.

3.2.9 When you are completely familiar with the configuration of the ROBERTS GORDON® BZC 100 controller to be installed, refer to *Section 4, starting on Page 12* for typical external wiring diagrams.

3.2.10 The controller is supplied with 4 separator plates installed. The separator plates are shown on *Page 8, Section 3.2.10, Figure 8.*

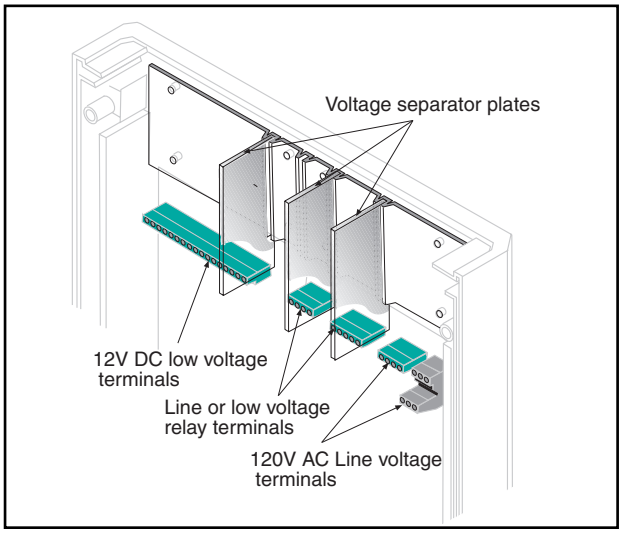

Voltage separator plates
12V DC low voltage terminals
Line or low voltage relay terminals
120V AC Line voltage terminals

FIGURE 8 - Separator Plate Detail

Three separator plates must be removed so that one plate remains, separating low and line voltage.

Page 9, Section 3.2.10, Figure 9, shows the separator plate detail for an installation where relay 1 switches line voltage and relay 2 switches low voltage 12V DC.

The three un-used separator plates must be discarded.

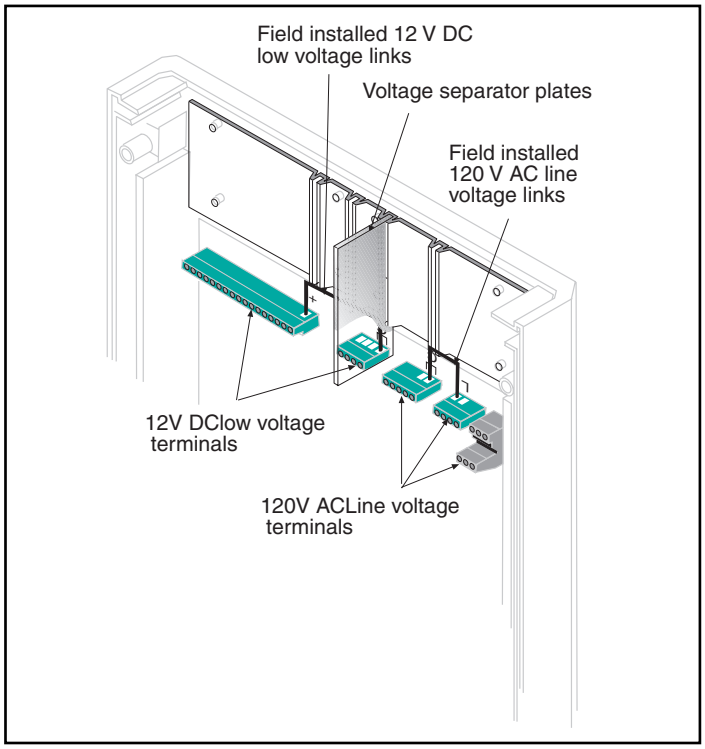


FIGURE 9 - Separator Plate Removal Detail

3.2.11 Reconnect the ribbon cable to the PCB board and replace the cover of the controller by replacing the 4 securing screws and the 4 clips.

3.3 ELECTRICAL INSTALLATION REQUIREMENTS

⚠ WARNING

Electrical Shock Hazard

Disconnect electrical power before servicing.

This appliance must be connected to a properly grounded electrical source.

Failure to follow these instructions can result in death or electrical shock.

3.3.1 The panel should be supplied from a local fused isolator rated for a total amperage not exceeding 20A. If the total current load exceeds the isolator rating, the power to the burners can be switched by using a local relay. See *Page 13, Section 4.2 and Page 14, Section 4.3* for alternate methods.

The method for calculating the current loading is as follows:

GORDONRAY® BH:	1 A/burner
GORDONRAY® DF:	1 A/burner
CARIBE®:	1 A/burner
VANTAGE® TF:	1 A/burner
VANTAGE® EV:	0.2 A/burner
CORAYVAC®:	0.2 A/burner

Multiply the current for the individual burners above by the number of burners supplied from the panel to give the total current required. The pumps, VANTAGE® II and VANTAGE® HE burners do not count in this calculation because the power must be switched locally via a relay or contactor.

If the total current load exceeds 4.4A for any relay, then a local switching relay must be employed for the burners. The total added current load for all 3 relays must not exceed 20A.

3.3.2 ROBERTS GORDON® Pump Requirements

The pumps must be isolated separately from the panel. The contactor or relay will be energized via an output from the panel switched through the designated relay. See *Page 6, Section 1.9* for site specific configuration.

Use the table below to select the correct pump external wiring diagram.

ROBERTS GORDON® Pump	Supply Voltage	Relay Coil	Page	Section
EP 100	120V 1ph	120V AC	16	4.5
EP 201	120V 1ph	120V AC	16	4.5
EP 301	120V 1ph	120V AC	19	4.8
EP 100	120V 1ph	12V DC	18	4.7
EP 201	120V 1ph	12V DC	18	4.7
EP 301	120V 1ph	12V DC	20	4.9
EP 203	230V 3ph	120V AC	21	4.10
EP 303	230V 3ph	120V AC	21	4.10
EP 203	230V 3ph	12V DC	22	4.11
EP 303	230V 3ph	12V DC	22	4.11

Roberts-Gordon provides at an additional cost, the following IEC contactor and overload starter packages **required for 3ph pumps**, the contents are listed below.

P/N	Description
10050000	**Starter 12V DC EP 203/303 3ph**
10001001	Enclosure IEC metal 8" x 5" x 5" Nema
10001700	Contactor IEC 9A 12V DC
10001706	Overload IEC 1.6-5.0A 3ph
10050001	**Starter 120V AC EP 203/303 3ph**
10001001	Enclosure IEC metal 8" x 5" x 5" Nema
10001701	Contactor IEC 9A 120V AC
10001706	Overload IEC 1.6-5.0A 3ph

Roberts-Gordon provides at an additional cost, the following IEC contactor and enclosures **required for connection of the EP 301 pump to the controller**, the part numbers are listed below.

For wiring diagrams of the EP 301 pump with the controller, see *Page 19, Section 4.8 and Page 20, Section 4.9.*

For 120V AC Connection	
P/N	Description
10050006	**Contactor 120V AC EP 301 1ph**
10001705	Contactor IEC 16A 120V AC
10001001	Enclosure IEC metal 8" x 5" x 5" Nema
For 12V DC Connection	
P/N	Description
10050007	**Contactor 12V DC EP 301 1ph**
10001704	Contactor IEC 16A 12V DC
10001001	Enclosure IEC metal 8" x 5" x 5" Nema

Roberts-Gordon provides the following IEC contactor and overload starter packages **optional for 1ph pumps**, (to be used if pump trip indication is required see *Page 6, Section 1.9*). The contents are listed below:

P/N	Description
10050002	**Starter 12V DC EP 201 1ph**
10001001	Enclosure IEC metal 8" x 5" x 5" Nema
10001702	Contactor IEC 12A 12V DC
10001707	Overload IEC 5.0-15.0A 1ph
10050003	**Starter 120V AC EP 201 1ph**
10001001	Enclosure IEC metal 8" x 5" x 5" Nema
10001703	Contactor IEC 12A 120V AC
10001707	Overload IEC 5.0-15.0A 1ph
10050004	**Starter 12V DC EP 301 1ph**
10001001	Enclosure IEC metal 8" x 5" x 5" Nema
10001704	Contactor IEC 16A 12V DC
10001708	Overload IEC 12.0-32.0A 1ph
10050005	**Starter 120V AC EP 301 1ph**
10001001	Enclosure IEC metal 8" x 5" x 5" Nema
10001705	Contactor IEC 16A 120V AC
10001708	Overload IEC 12.0-32.0A 1ph

3.3.3 Outside air supply

If an outside air blower is to be used with any of the above options see *Page 23, Section 4.12 and Page 24, Section 4.13* for external wiring diagrams.

3.3.4 Important voltage selection

The controller can be used with either 120V or 230V 1ph. Ensure the voltage selector switch is set to 115V for 120V operation. See *Page 38, Section 8, Figure 35,* (ITEM 3).

3.3.5 Cable requirements:

Line power supply:
As per individual building specification for class of cable to be used. Use copper conductors only. To size the cable, use the amperage of the burners given on *Page 9, Section 3.3.1*, for each individual zone.

12V DC supply to relay boxes and contactor:
The low voltage output cable must be rated for up to 250V. The cable does not have to be shielded. The limit on distance is the voltage drop which occurs due to the resistance of the cable. Maximum current available is 315 mA.

12V DC inputs including sensors:
Shielded cable Belden 8451, General Cable C2514 or equivalent. See *Page 11, Section 3.3.5, Figure 10* for an illustration of the shielded cable minimum specification to be used.

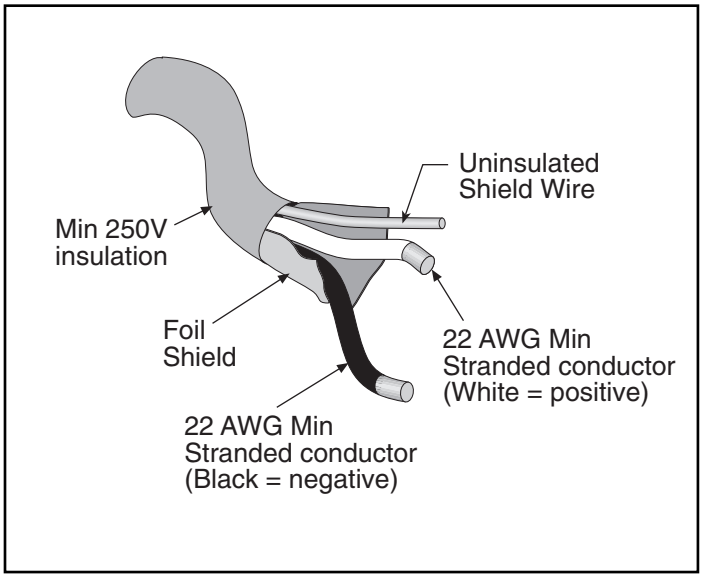


FIGURE 10 - Shielded Cable Detail

3.3.6. Sensor Mounting

The sensor measures the air temperature in the building. It is important that the sensor is located in an area within the heated zone at occupant level. The sensor should be located in a position that is not shaded from the infrared heating.

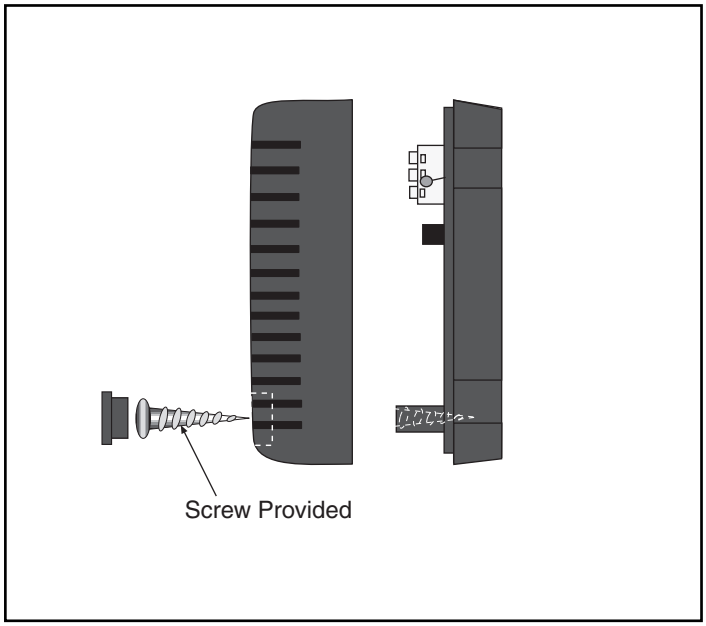


FIGURE 11 - Sensor Cover Assembly

Do not use mounting holes behind PCB Board. Sensor suitable for mounting on a 4" Conduit Box.

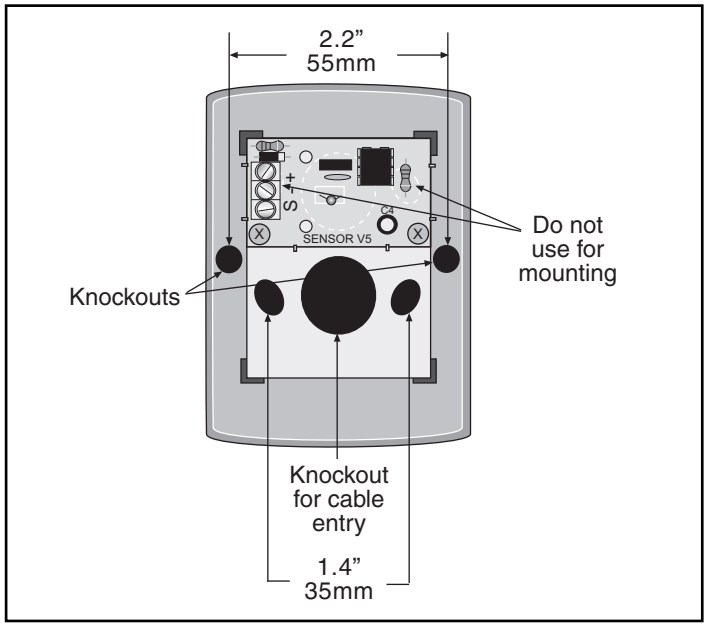
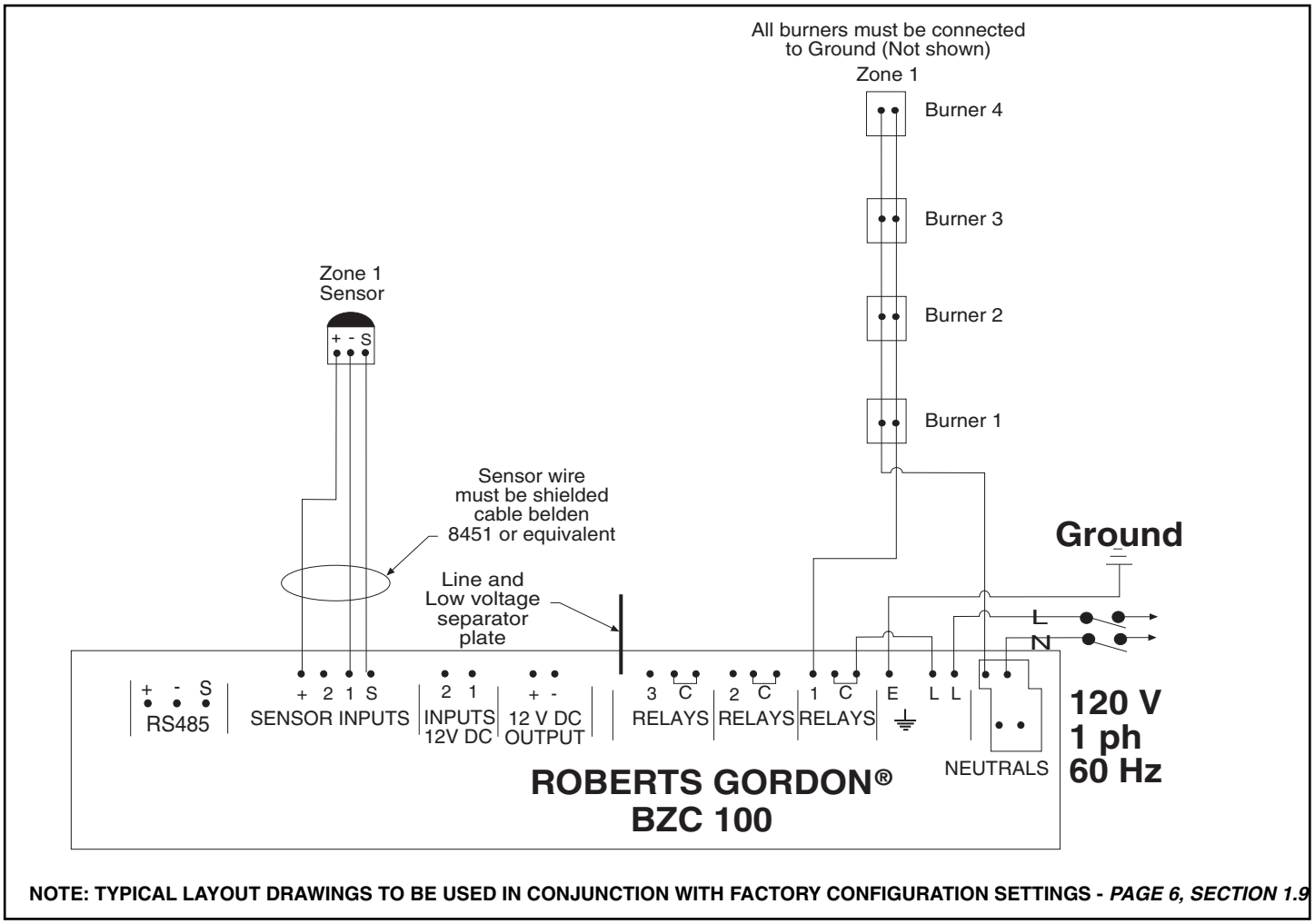


FIGURE 12 - Mounting

▶SECTION 4: TYPICAL EXTERNAL DIAGRAMS

4.1 GORDONRAY® BH, CARIBE® AND VANTAGE® TF UNITARY HEATERS ARRANGED IN ONE ZONE



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 13 - Typical GORDONRAY® BH, CARIBE® and VANTAGE® TF Unitary External Wiring Diagram

4.1.1 Description of external wiring diagram

The external wiring diagram above shows the connections for one zone of unitary burners. Use the diagram in conjunction with the configuration sheet to identify which relay is to be used for the unitary heaters.

4.1.2 Description of heaters

ROBERTS GORDON® Unitary heaters for direct connection to the controller comprise of the GORDONRAY® BH, CARIBE® and VANTAGE® TF unitary heaters.

The low voltage jumper at the CARIBE® burner must be connected.

Any heaters sharing a common vent must be controlled as the same zone.

4.1.3 Sequence of operation

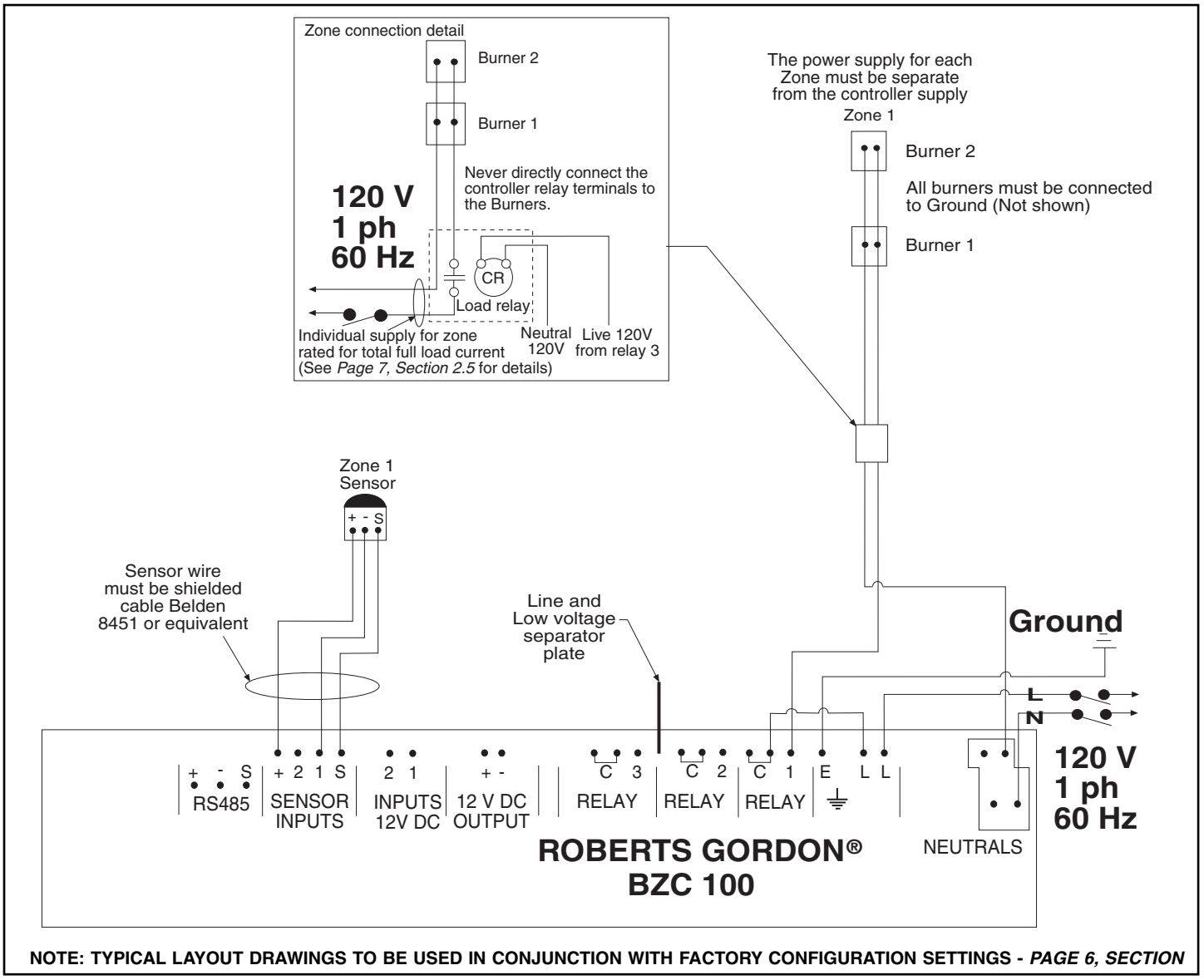
a. On demand for heat, the controller will send power to the fan and burners. The fan will begin operation.

b. Once pressure is established, the contacts in the pressure switch inside the burner will close.

c. The burner will go through a 30 second purge and cycle time.

d. Once flame is established, the heater will remain in operation until either a lockout condition occurs or the heating is turned off by satisfying temperature set point.

4.2 VANTAGE® II AND VANTAGE® HE UNITARY HEATERS ARRANGED IN ONE ZONE



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION*

FIGURE 14 - Typical VANTAGE® II and VANTAGE® HE Unitary External Wiring Diagram

4.2.1 Description of external wiring diagram

The external wiring diagram above shows the connections for one zone of unitary burners via a load relay. Use the diagram in conjunction with the configuration sheet to identify which relay is to be used for the unitary heaters.

4.2.2 Description of heaters

ROBERTS GORDON® Unitary heaters for indirect connection to the controller comprise of the VANTAGE® II and VANTAGE® HE unitary heaters.

The connection shown on *Page 13, Section 4.2, Figure 14* should also be used for a zone of CARIBE®, GORDONRAY® BH or VANTAGE® TF if the total zone requirement exceeds 4.4A.

The low voltage jumper at the CARIBE® burner must be connected.

Any heaters sharing a common vent must be controlled as the same zone.

4.2.3 Sequence of operation

a. On demand for heat, the controller will send power to the fan and burners. The fan will begin operation.

b. Once pressure is established, the contacts in the pressure switch inside the burner will close.

c. The burner will go through a 30 second purge and cycle time.

d. Once flame is established, the heater will remain in operation until either a lockout condition occurs or the heating is turned off by satisfying temperature set point.

4.3 UNITARY HEATERS ARRANGED IN ONE ZONE WITH CONTROL VIA A 12V DC RELAY

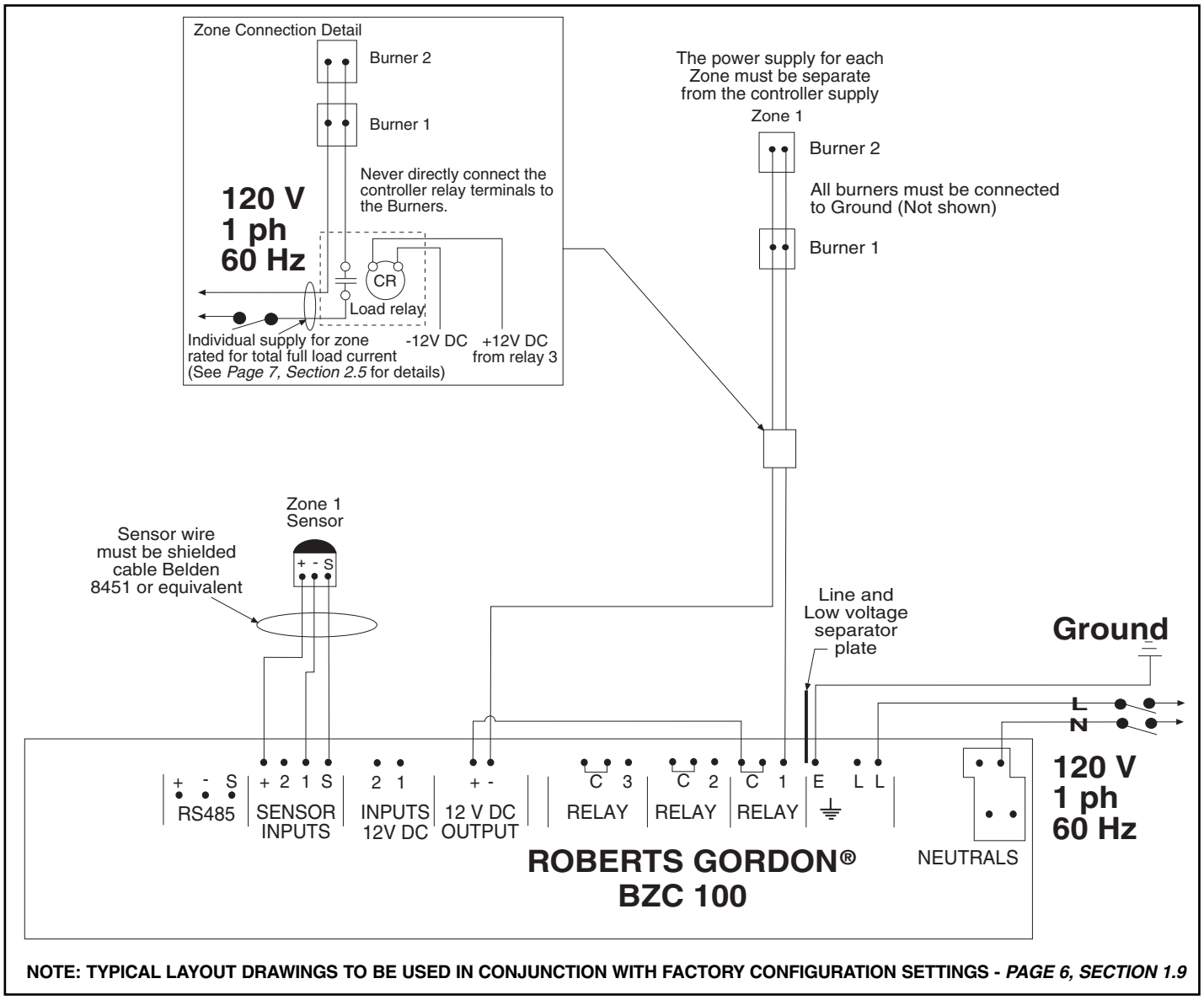


FIGURE 15 - Alternate 12V DC Unitary External Wiring Diagram

4.3.1 Description of external wiring diagram

The external wiring diagram above shows the connections for one zone of unitary burners via a load relay with a 12V DC coil. Use the diagram in conjunction with the configuration sheet to identify which relay is to be used for the unitary heaters.

4.3.2 Description of heaters

ROBERTS GORDON® Unitary heaters for indirect connection to the controller using 12V DC wiring comprise of the VANTAGE® II, HE, TF, CARIBE® and GORDONRAY® BH unitary heaters.

The low voltage jumper at the CARIBE® burner must be connected.

Any heaters sharing a common vent must be controlled as the same zone.

4.3.3 Sequence of operation

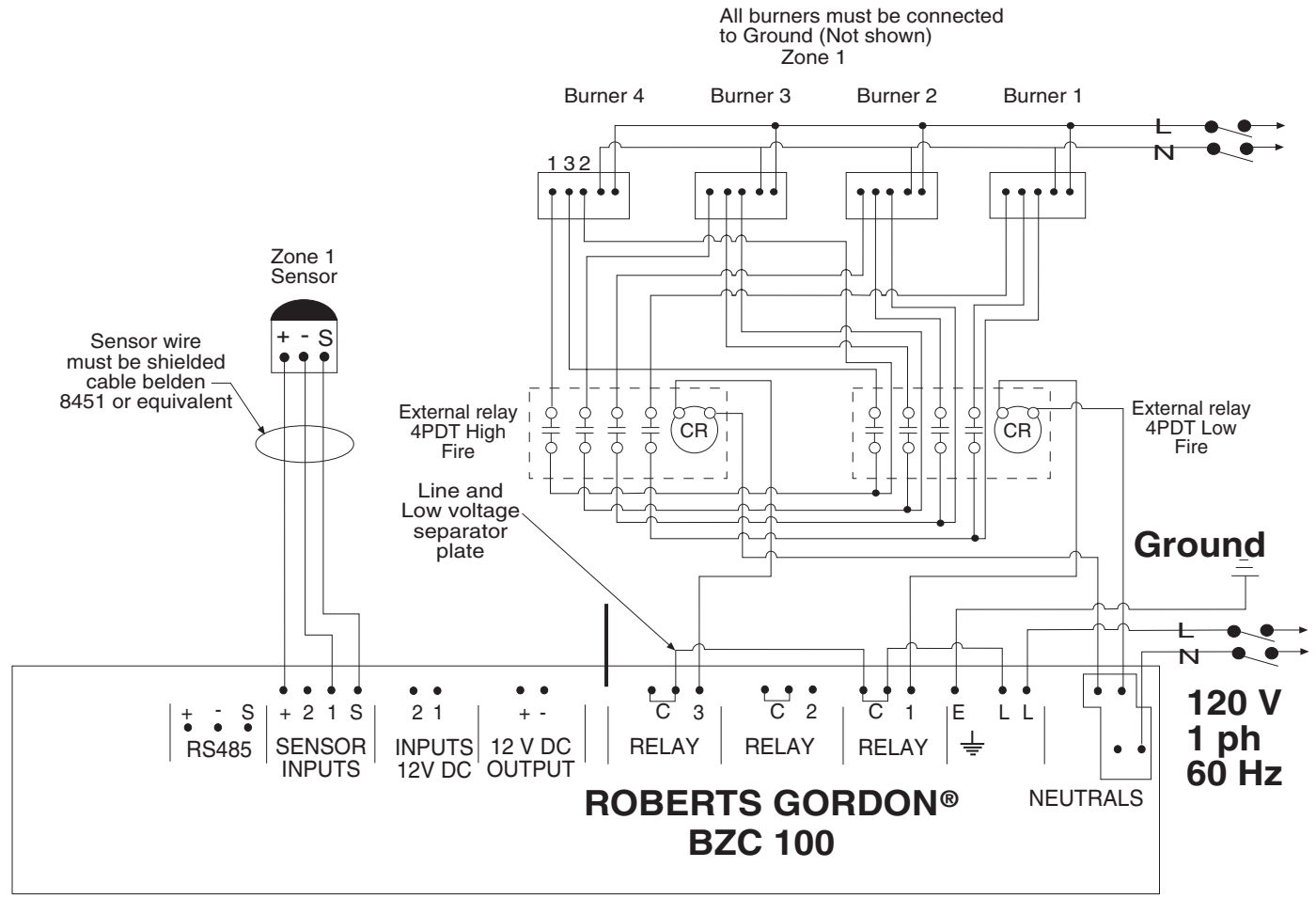
a. On demand for heat, the controller will send power to the fan and burners. The fan will begin operation.

b. Once pressure is established, the contacts in the pressure switch inside the burner will close.

c. The burner will go through a 30 second purge and cycle time.

d. Once flame is established, the heater will remain in operation until either a lockout condition occurs or the heating is turned off by satisfying temperature set point.

4.4 GORDONRAY® DF UNITARY HEATERS ARRANGED IN ONE ZONE



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 16 - Typical GORDONRAY® DF External Wiring Diagram

4.4.1 Description of external wiring diagram

The external wiring diagram above shows the connections for one zone of GORDONRAY® DF heaters. The DF burner has both a low and a high fire stage. The external relays must be used to activate the firing stages. Use the diagram in conjunction with the configuration sheet to identify which relays are to be used for GORDONRAY® DF high and low fire.

4.4.2 Description of heaters

GORDONRAY® DF heaters are unitary heaters with two firing stages. The high and low fire operation is a 24V AC circuit.

4.4.3 Sequence of operation

a. There must be a temperature differential between high and low fire entered under the set up.

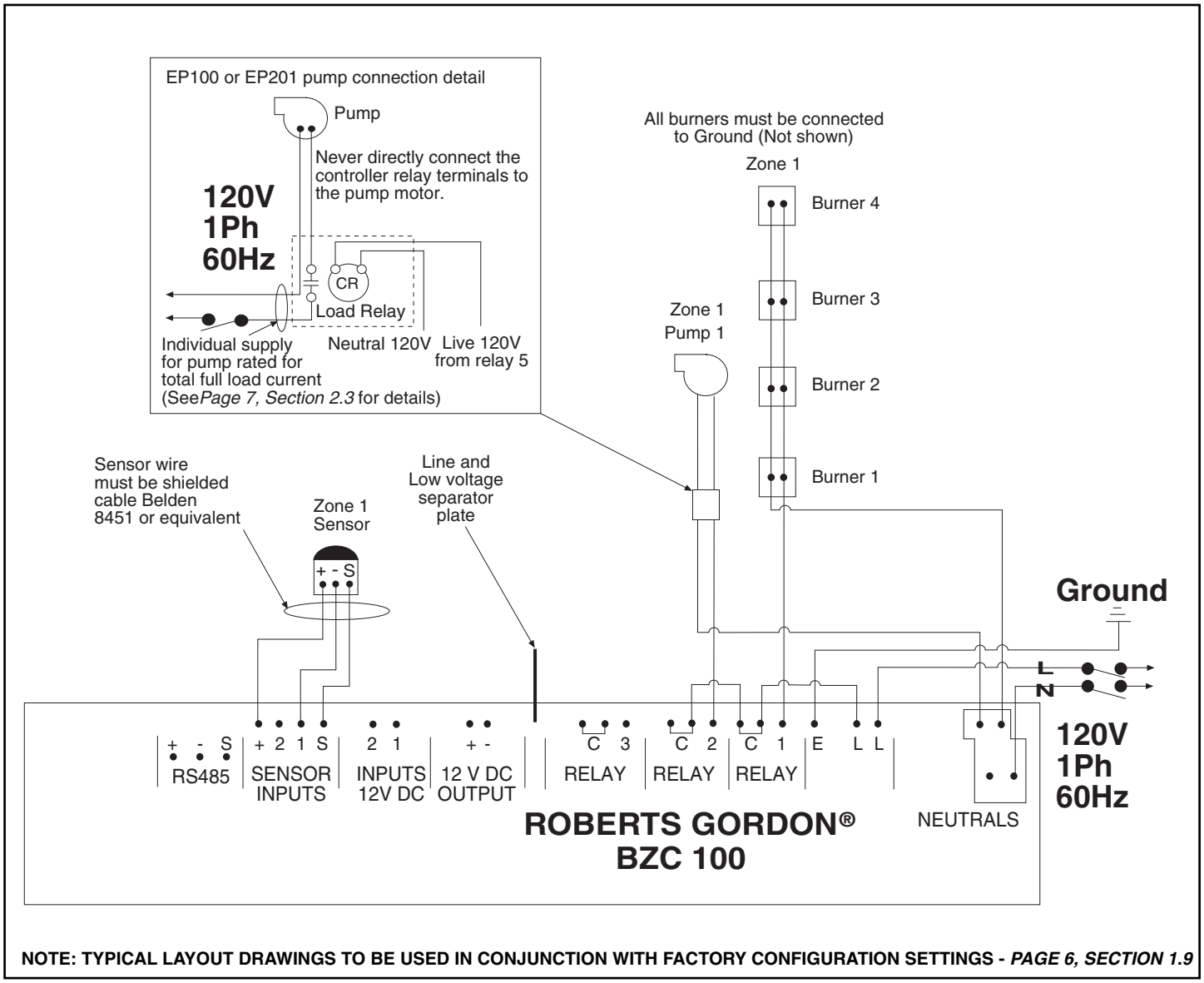
b. Demand for heat at the low fire stage will occur at the set point temperature displayed on the zone status screen.

c. Demand for heat at the high fire stage will occur at a temperature differential below the set point temperature displayed on the zone status screen.

d. The burner will go through a 30 second purge and cycle time.

e. Once flame is established, the system will remain in operation until either a lockout condition occurs or the heating is turned off by satisfying temperature set point.

4.5 VANTAGE® EV SYSTEM ARRANGED IN ONE ZONE



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 17 - Typical VANTAGE® EV External Wiring Diagram

4.5.1 Description of external wiring diagram

The external wiring diagram above shows the connections for one zone of a VANTAGE® EV system. Use the diagram in conjunction with the configuration sheet to identify which relays are to be used for VANTAGE® EV burners and the pump.

4.5.2 Description of heaters

VANTAGE® EV systems comprise of infrared tube heaters connected by manifold pipe to a pump. The power to the pump is supplied separately and switched by the controller via a load relay or contactor. Refer to *Page 10, Section 3.3.2* for pump alternatives.

4.5.3 Sequence of operation

a. On demand for heat, the controller will send power to the pump and burners. The pump will begin operation.

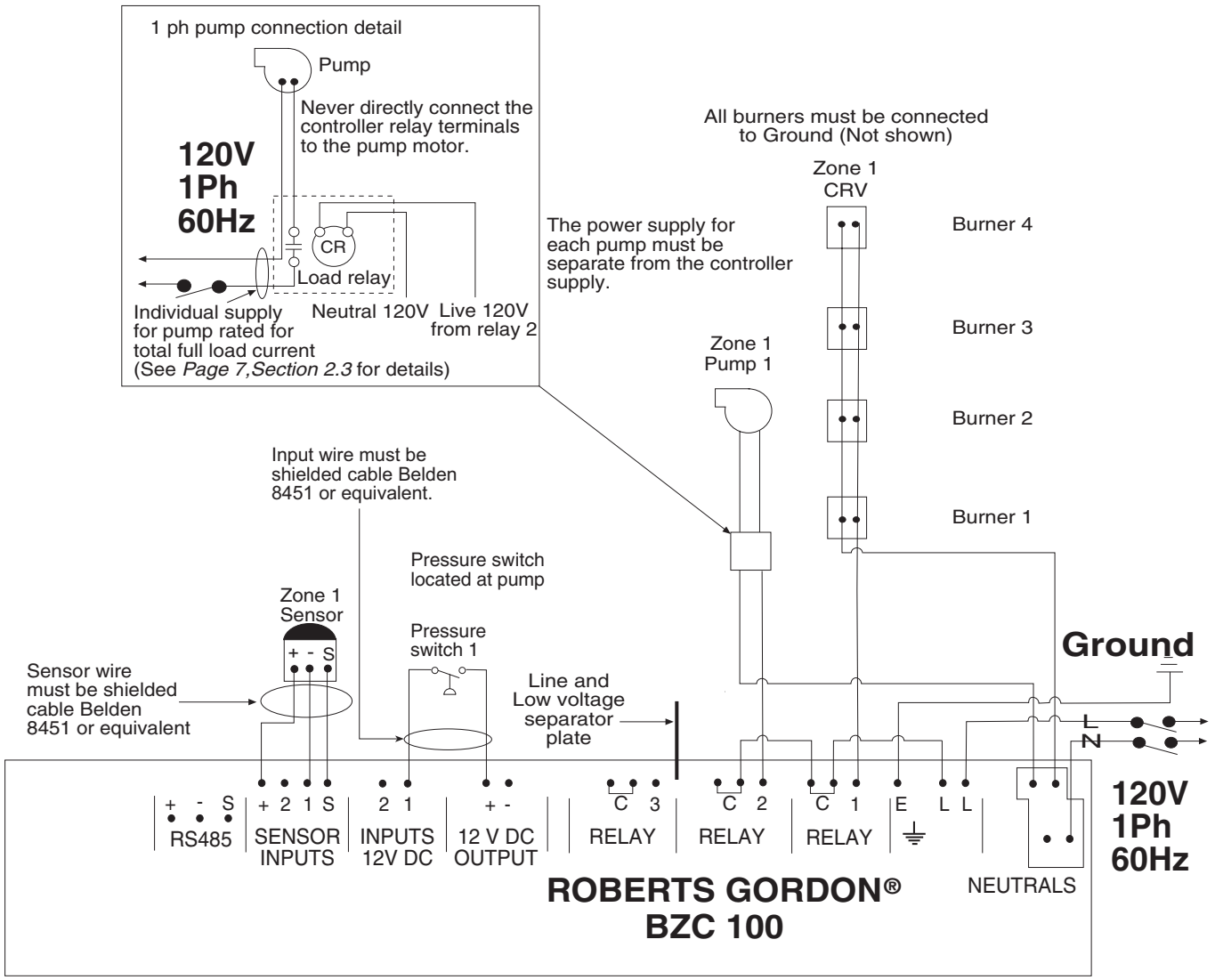
b. Once vacuum is established, the contacts to the pressure switch inside the burner will close.

c. The burner will go through a 30 second purge and cycle time.

d. Once flame is established, the system will remain in operation until either there is demand for heat in another zone connected to the common fan, at which point the system will shut down for 30 seconds to allow the pressure switches to reset before re-establishing; or a lockout condition occurs; or the heating is turned off by satisfying temperature set point.

e. After the heating is turned off by all zones reaching the set point, the pump will continue operation for a 2 minute post purge cycle.

4.6 CORAYVAC® SYSTEM ARRANGED IN ONE ZONE



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION*

FIGURE 18 - Typical CORAYVAC® External Wiring Diagram

4.6.1 Description of external wiring diagram

The external wiring diagram above shows the connections for one zone of a CORAYVAC® system. Use the diagram in conjunction with the configuration sheet to identify which relays are to be used for CORAYVAC® burners, pump and pressure switch.

4.6.2 Description of heating system

CORAYVAC® systems comprise of a series of burners linked to a common pump. The power to the pump is supplied separately and switched by the controller via a load relay or contactor. Refer to *Page 10, Section 3.3.2* for pump alternatives.

4.6.3 Sequence of operation

a. On demand for heat, the controller will send power to the pump. The pump will begin operation.

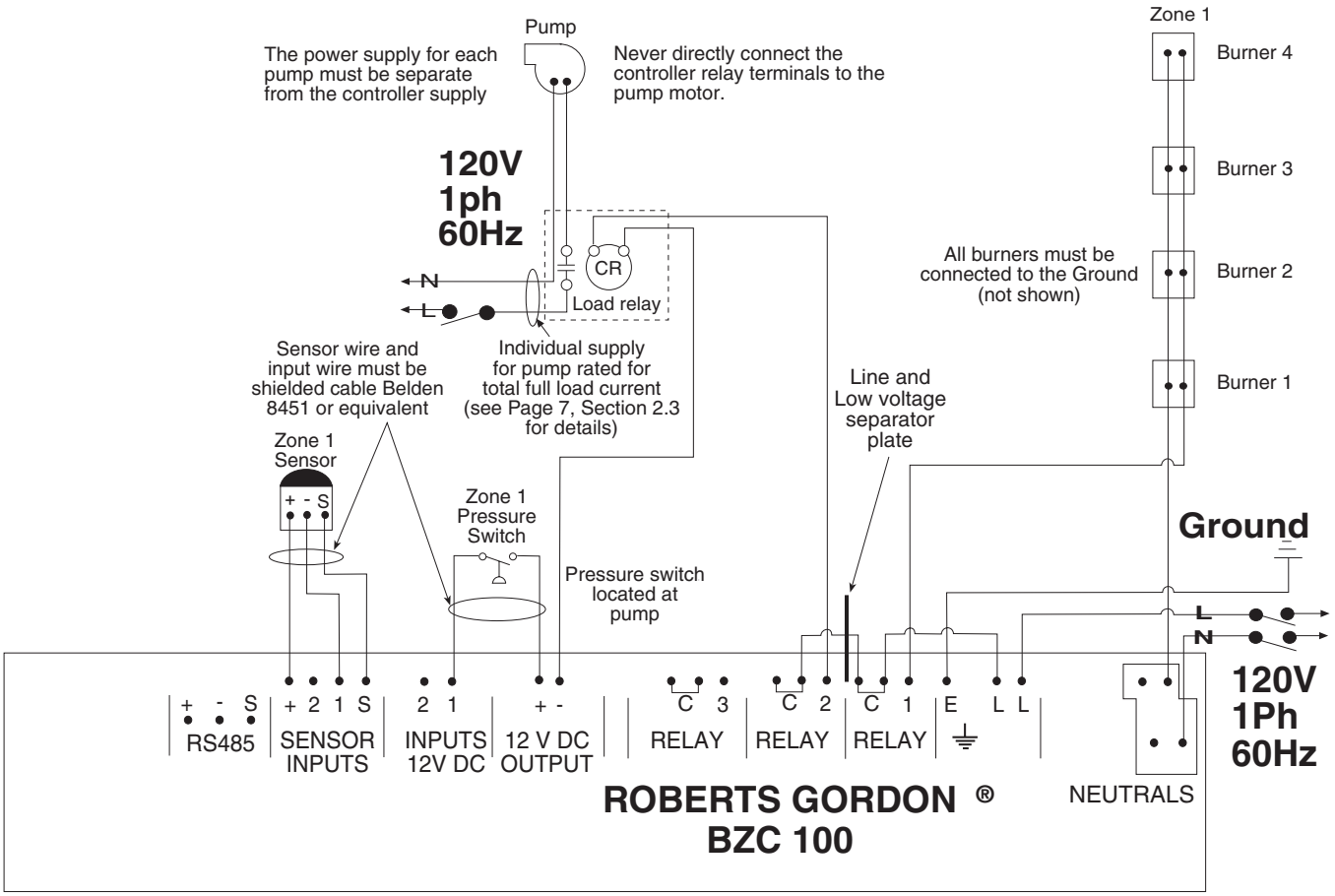
b. Once vacuum is established, the contacts to the pressure switch at the pump will close.

c. The controller sends power to the burners. The burners will go through a 45 second purge and cycle time.

d. Once flame is established, the heater will remain in operation until either a lockout condition occurs or the heating is turned off by satisfying temperature set point.

e. After the heating is turned off, the pump will continue operation for a 2 minute post purge.

4.7 EP 100 AND EP 201 1PH PUMP CONNECTION (12V DC COIL)



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

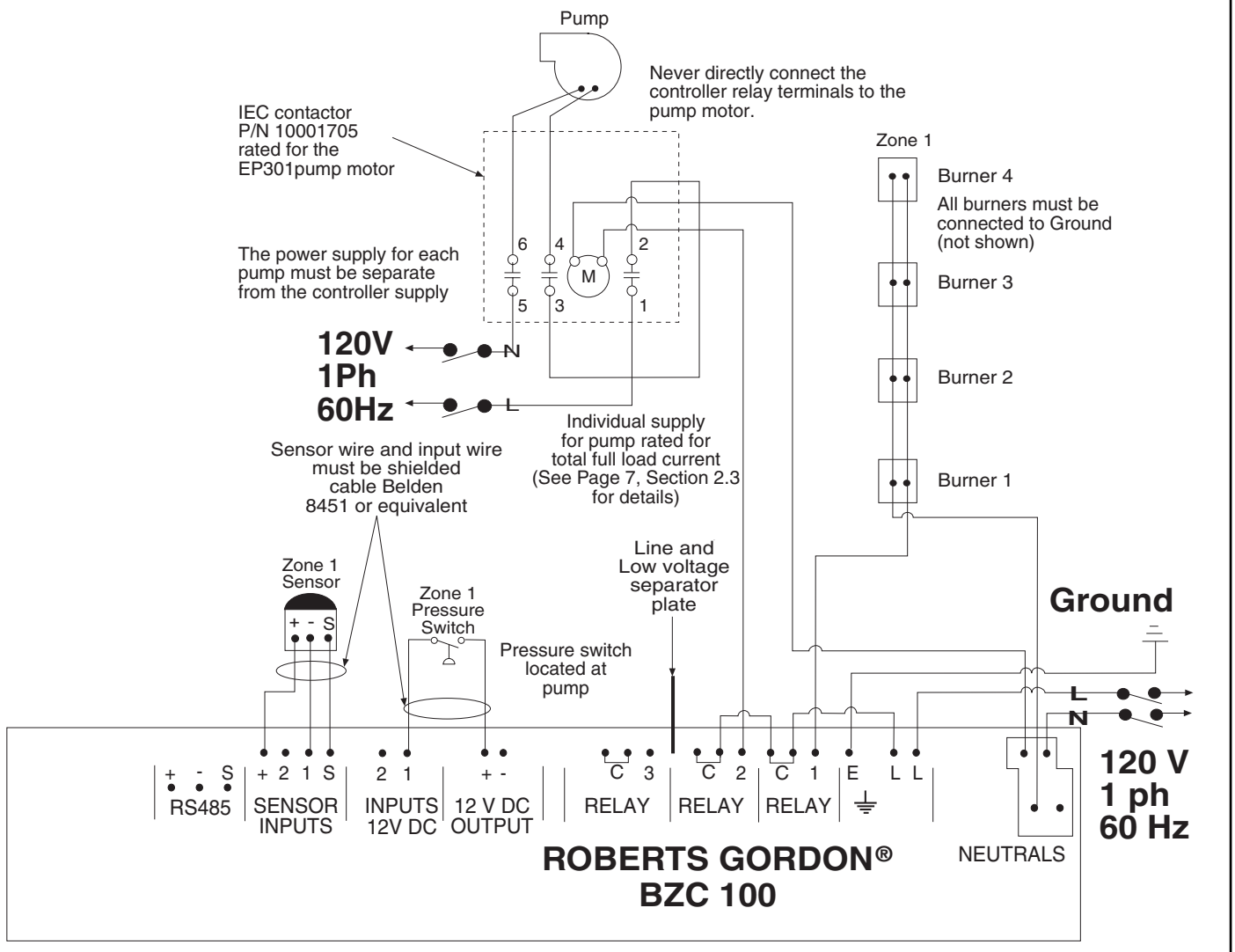
FIGURE 19 - Typical EP 100 and Ep 201 1ph External Wiring Diagram (12V DC Switching)

4.7.1 Description of external wiring diagram

The external wiring diagram above shows the connection for a single zone CORAYVAC® system. The power to the pump is supplied separately and switched by the controller via a load relay with a 12V DC coil. Refer to *Page 10, Section 3.3.2* for pump alternatives.

For a VANTAGE® EV system, the pressure switch located at the pump is not required. See *Page 16, Section 4.5* for detailed sequence of operation.

4.8 EP 301 1PH PUMP CONNECTION (120V AC COIL)



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 20 - Typical EP 301 Pump Contactor External Wiring Diagram

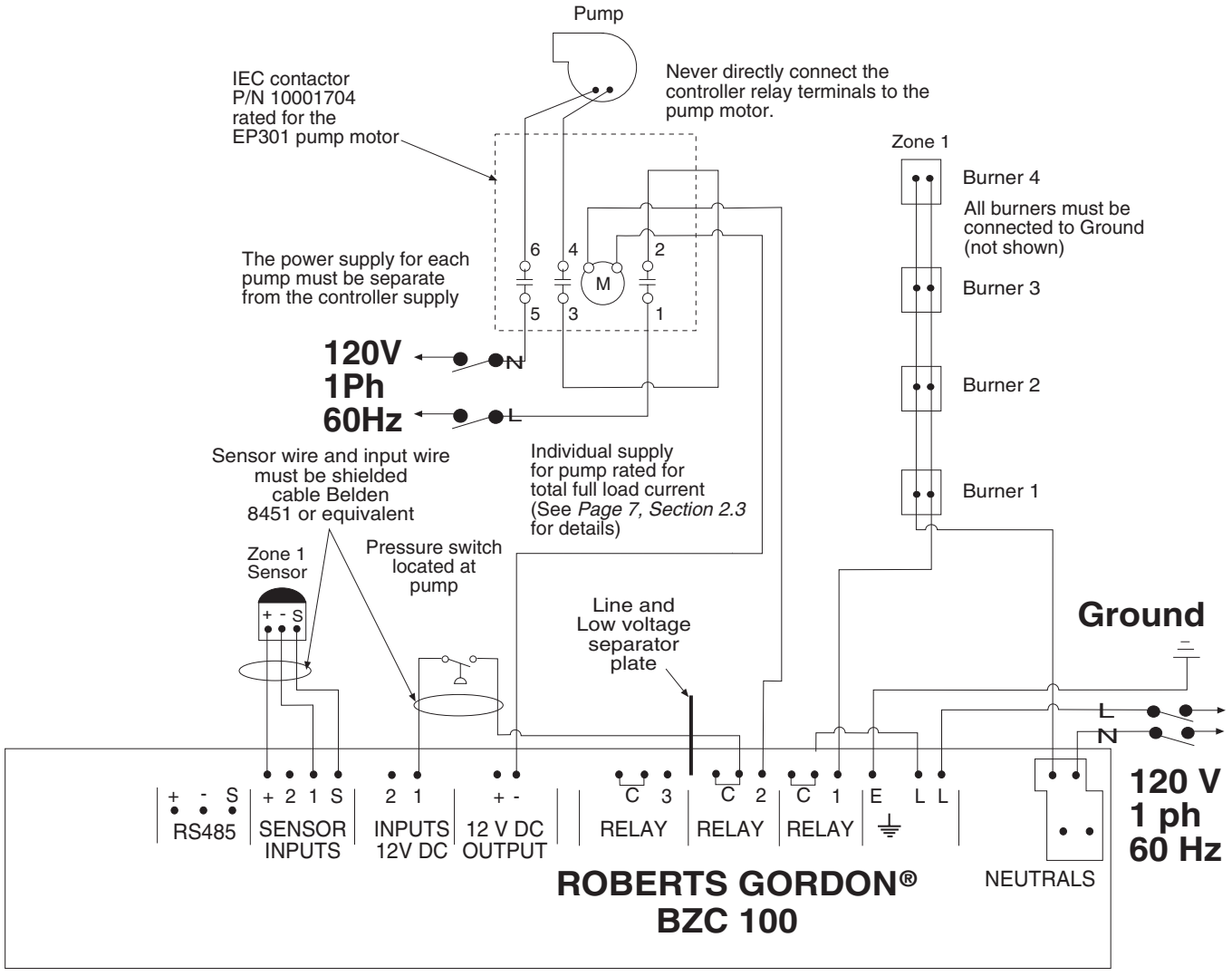
4.8.1 Description of external wiring diagram

The external wiring diagram above shows the connection for a single zone CORAYVAC® system. The power to the EP 301 pump is supplied separately and switched by the controller via a contactor with a 120V AC coil. Refer to *Page 10, Section 3.3.2* for pump alternatives.

For a VANTAGE® EV system, the pressure switch located at the pump is not required. See *Page 16, Section 4.5* for detailed sequence of operation.

See *Page 7, Section 2.3* for correct overload rating.

4.9 EP 301 1PH PUMP CONNECTION ALTERNATIVE (12V DC COIL)



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 21 - Typical EP 301 Pump Contactor External Wiring Diagram (12V DC Switching)

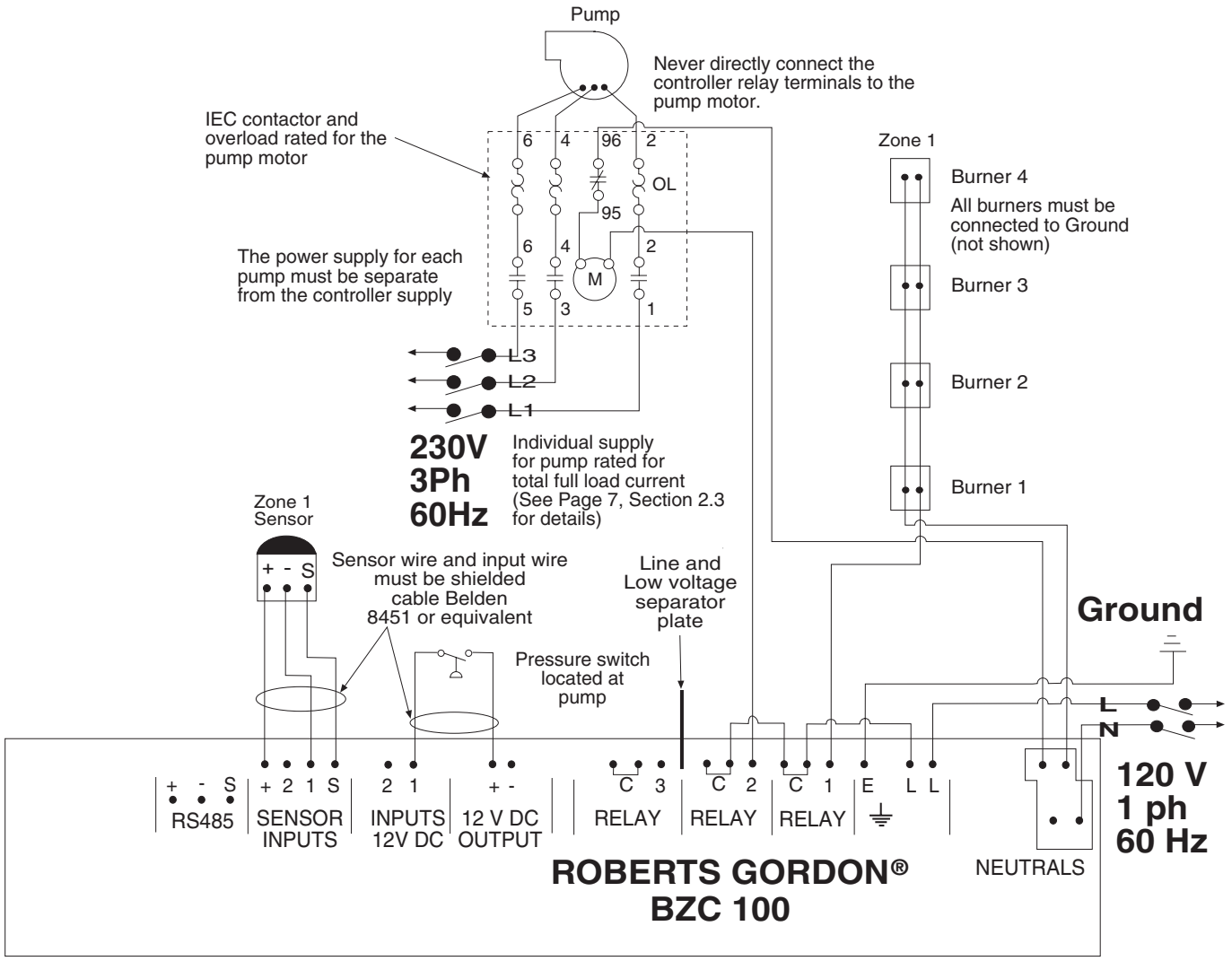
4.9.1 Description of external wiring diagram

The external wiring diagram above shows the connection for a single zone CORAYVAC® system. The power to the EP 301 pump is supplied separately and switched by the controller via a contactor with a 12V DC coil. Refer to *Page 10, Section 3.3.2* for pump alternatives.

For a VANTAGE® EV system, the pressure switch located at the pump is not required. See *Page 16, Section 4.5* for detailed sequence of operation.

See *Page 7, Section 2.3* for correct overload rating.

4.10 EP 203 AND EP 303 3PH PUMP CONNECTION (120V AC COIL)



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 22 - Typical 3ph Pump Starter External Wiring Diagram

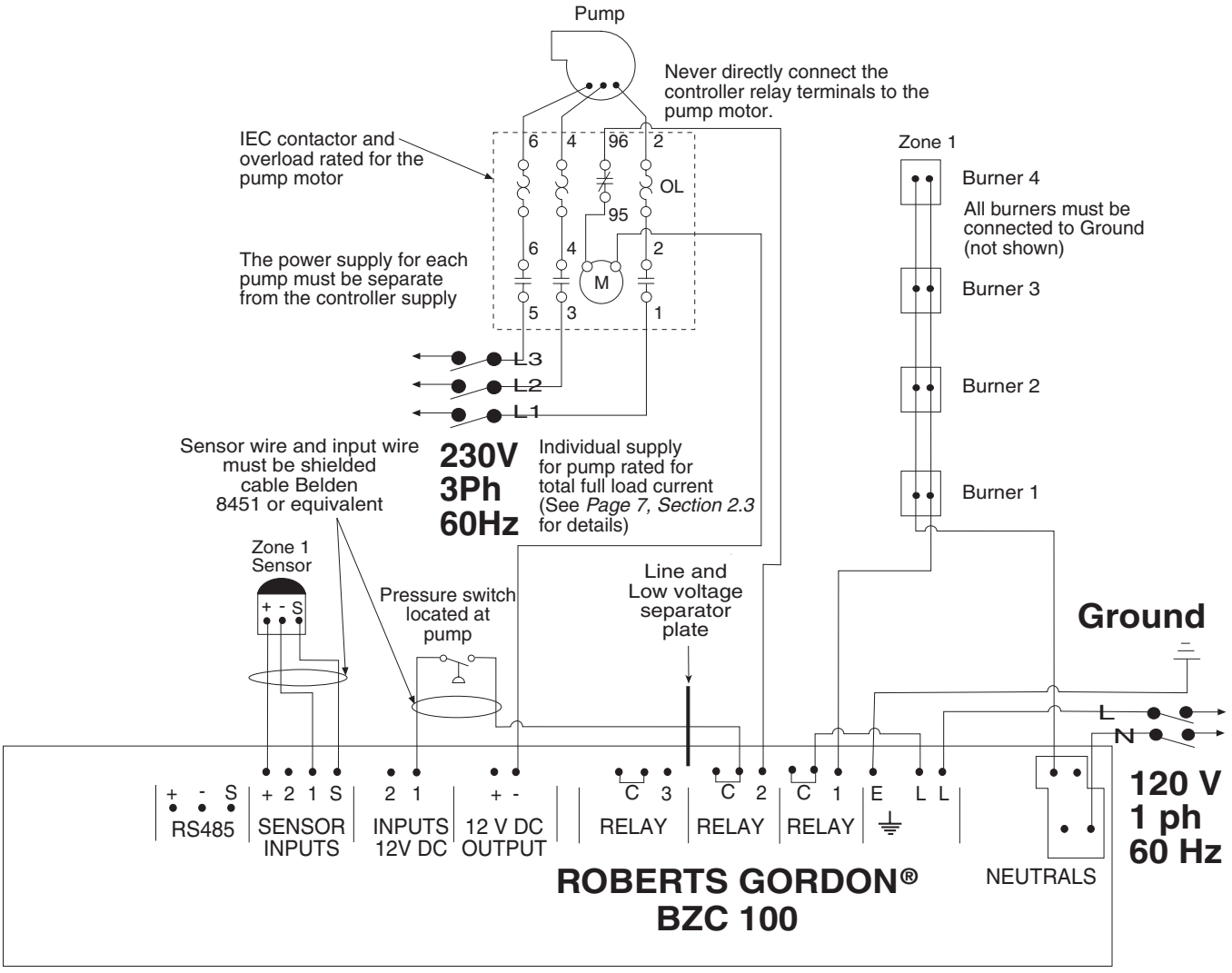
4.10.1 Description of external wiring diagram

The external wiring diagram above shows the connection for a single zone CORAYVAC® system. The power to the pump is supplied separately and switched by the controller via a contactor with a 120V AC coil. Refer to *Page 10, Section 3.3.2* for pump alternatives.

For a VANTAGE® EV system, the pressure switch located at the pump is not required. See *Page 16, Section 4.5* for detailed sequence of operation.

See *Page 7, Section 2.3* for correct overload rating.

4.11 EP 203 AND EP 303 3PH PUMP CONNECTION ALTERNATIVE (12V DC COIL)



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 23 - Typical 3ph Pump Starter External Wiring Diagram (12V DC Switching)

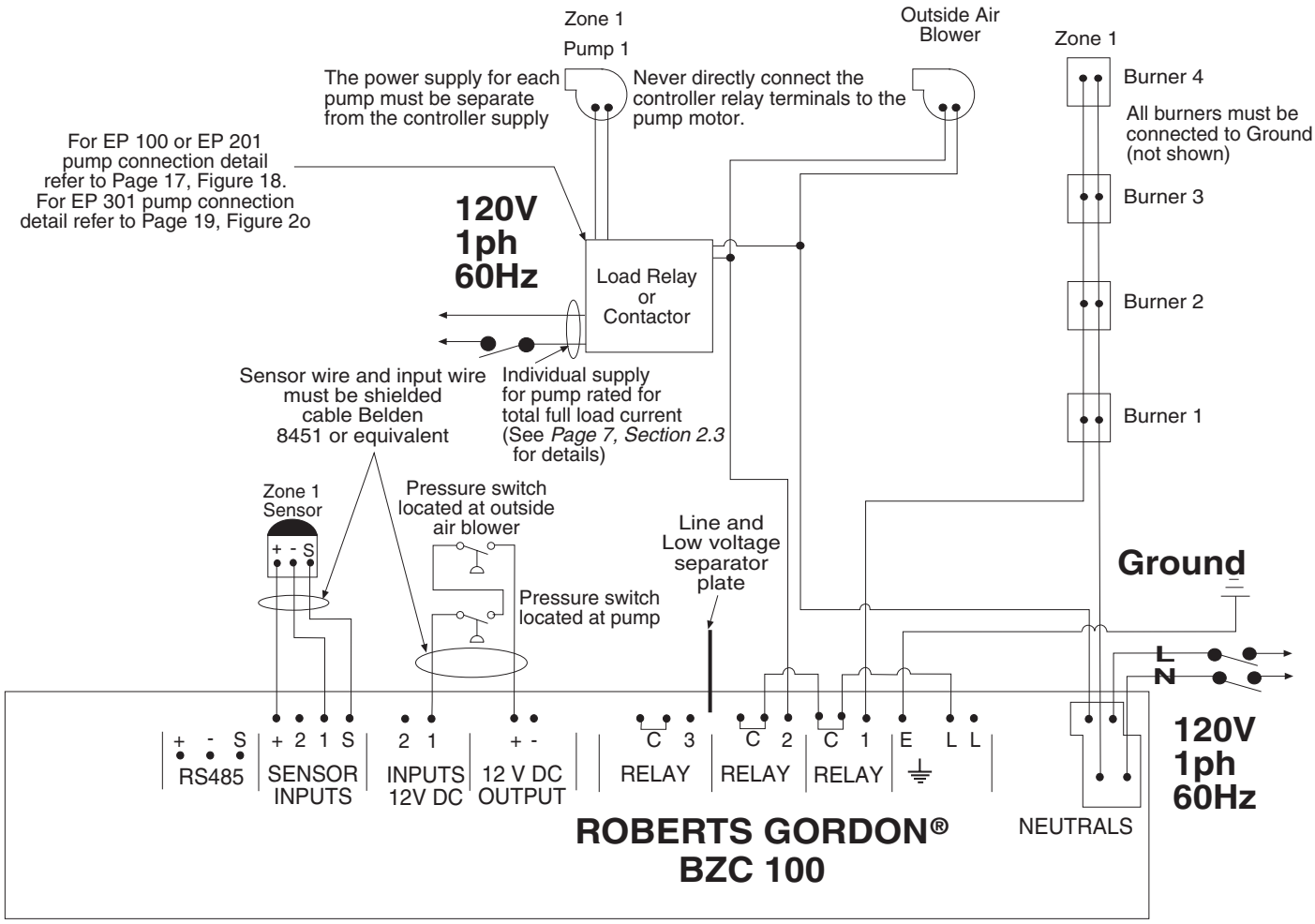
4.11.1 Description of external wiring diagram

The external wiring diagram above shows the connection for a single zone CORAYVAC® system. The power to the pump is supplied separately and switched by the controller via a contactor with a 12V DC coil. Refer to *Page 10, Section 3.3.2* for pump alternatives.

For a VANTAGE® EV system, the pressure switch located at the pump is not required. See *Page 16, Section 4.5* for detailed sequence of operation.

See *Page 7, Section 2.3* for correct overload rating.

4.12 OUTSIDE AIR BLOWER WITH 1PH PUMP CONNECTION



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 24 - Typical 1ph Pump with Outside Air Blower External Wiring Diagram

4.12.1 Description of external wiring diagram

The external wiring diagram above shows the connection for a single zone CORAYVAC® system (EP 100, EP 201 or EP 301 1ph pumps) with an outside air blower. The power to the pump is supplied separately and switched by the controller via a load relay (for EP 100 or EP 201) or contactor (for EP 301).

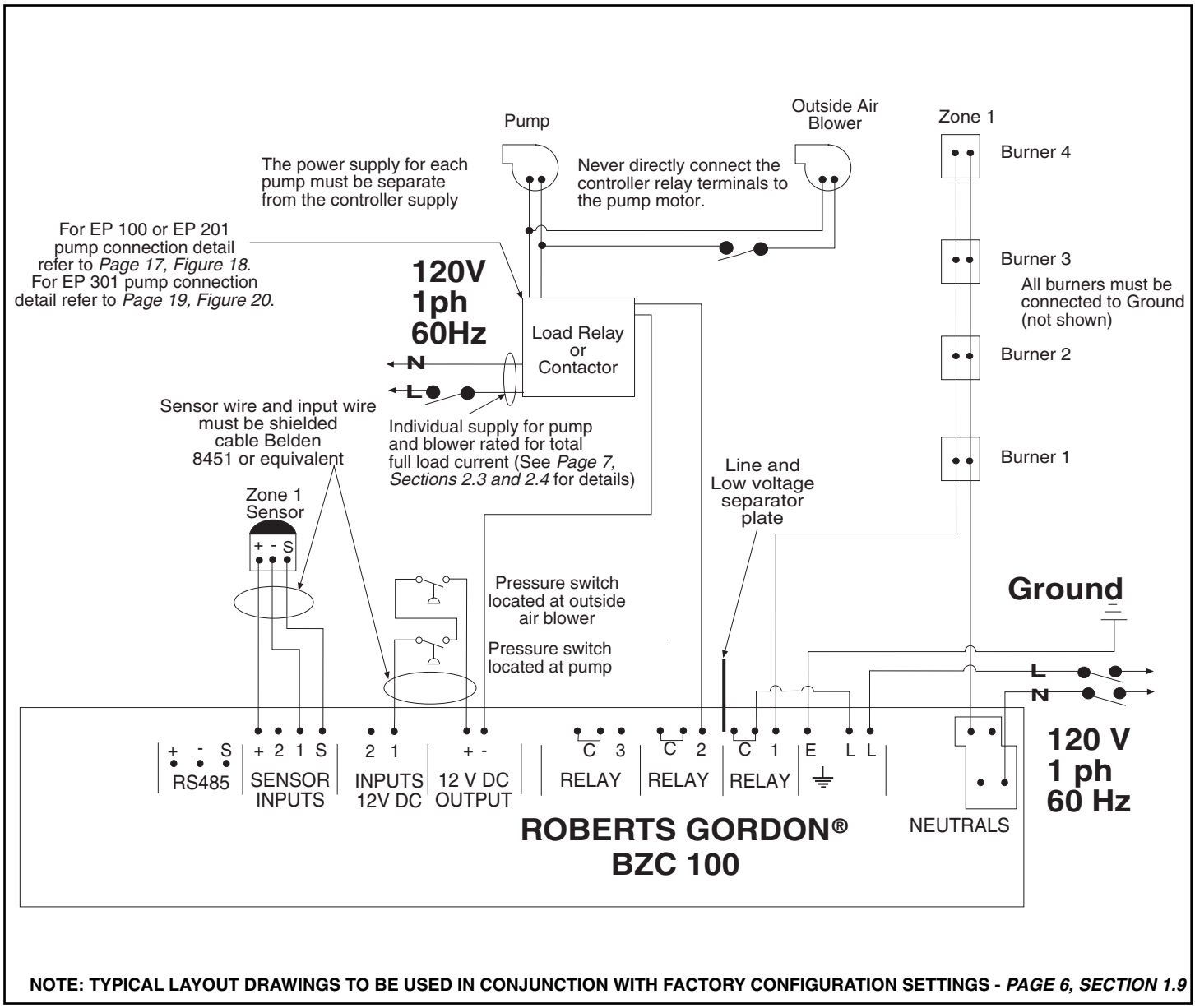
For other pumps with an outside air blower, use the "Live" from the panel to power the blower and switch the contactor for the pump.

For a VANTAGE® EV system, the pressure switch located at the pump is not required. See *Page 16, Section 4.5* for detailed sequence of operation.

Refer to *Page 10, Section 3.3.2* for pump alternatives.

Refer to *Page 7, Section 2.3* for correct overload rating.

4.13 OUTSIDE AIR BLOWER WITH 1PH PUMP CONNECTION ALTERNATIVE (12V DC COIL)


Pump
Outside Air Blower
Zone 1
Burner 4
Burner 3
All burners must be connected to Ground (not shown)
Burner 2
Burner 1
The power supply for each pump must be separate from the controller supply
Never directly connect the controller relay terminals to the pump motor.
For EP 100 or EP 201 pump connection detail refer to Page 17, Figure 18. For EP 301 pump connection detail refer to Page 19, Figure 20.
120V 1ph 60Hz
N
L
Load Relay or Contactor
Sensor wire and input wire must be shielded cable Belden 8451 or equivalent
Individual supply for pump and blower rated for total full load current (See Page 7, Sections 2.3 and 2.4 for details)
Line and Low voltage separator plate
Zone 1 Sensor
+ - S
Pressure switch located at outside air blower
Pressure switch located at pump
Ground
L
N
+ - S
RS485
+ 2 1 S
SENSOR INPUTS
2 1
INPUTS 12V DC
+ -
12 V DC OUTPUT
C 3
RELAY
C 2
RELAY
C 1
RELAY
E
L L
NEUTRALS
120 V 1 ph 60 Hz
ROBERTS GORDON® BZC 100

NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 25 - Typical 1ph Pump with Outside Air Blower External Wiring Diagram (12V DC Switching)

4.13.1 Description of external wiring diagram

The external wiring diagram above shows the connection for a single zone CORAYVAC® system (EP 100, EP 201 or EP 301 1ph pumps) with an outside air blower. The power to the pump is supplied separately and switched by the controller via a load relay (for EP 100 or EP 201) or contactor (for EP 301) with a 12V DC coil.

For other pumps with an outside air blower, use the DC output from the panel to switch both the load relay at the blower and the contactor for the pump.

For a VANTAGE® EV system, the pressure switch located at the pump is not required. See *Page 16, Section 4.5* for detailed sequence of operation.

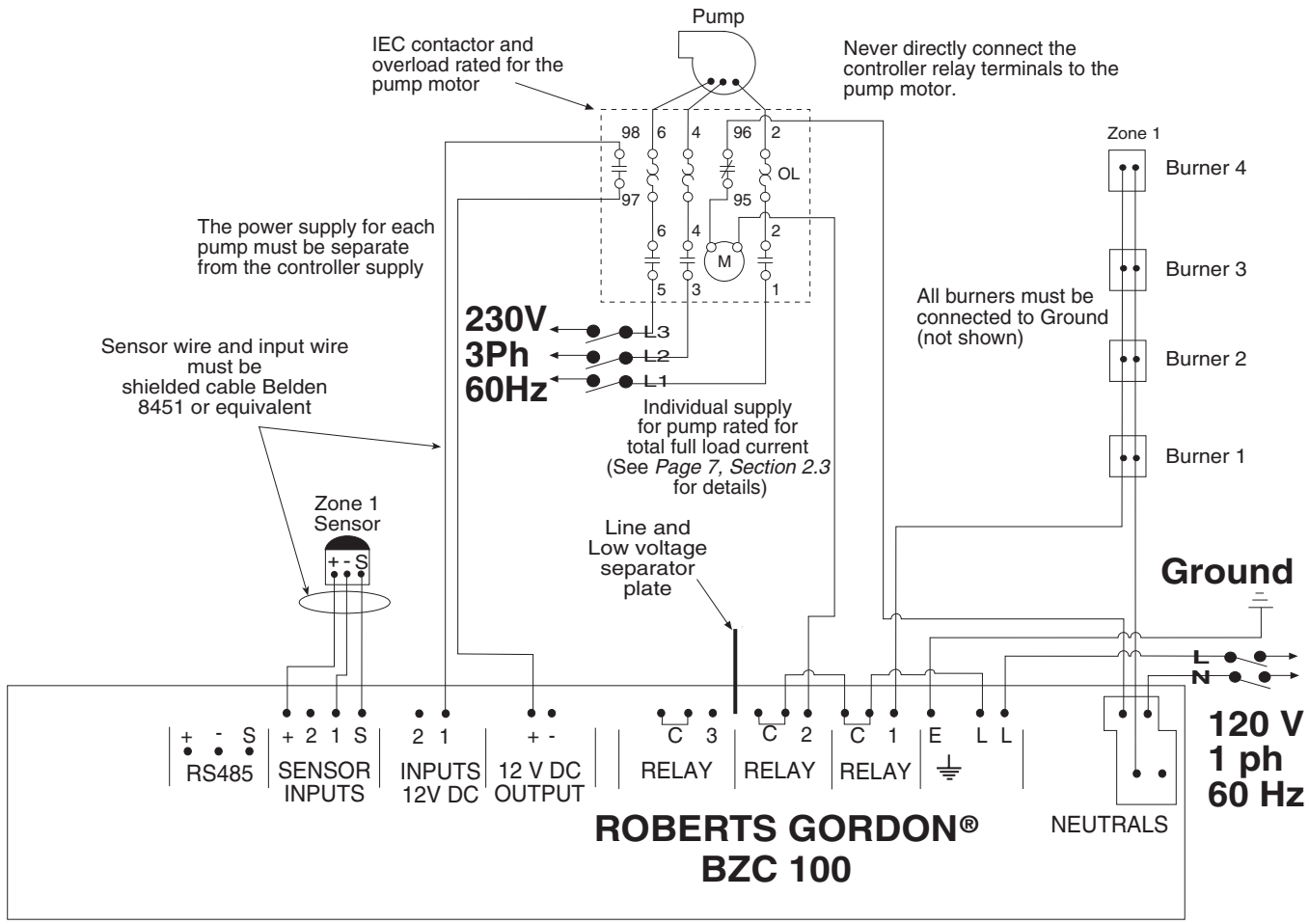
Refer to *Page 10, Section 3.3.2* for pump alternatives.

Refer to *Page 7, Section 2.3* for correct overload rating.

▶SECTION 5: ALARM SIGNAL CONDITION MONITORING

Alarm signal condition monitoring capabilities are available as inputs to the controller. The number of signals available is limited to the 2 inputs available CORAYVAC® pump pressure switch reserves the use of input 1. Input 1 is optionally available for lockout indication or for fire safety override. Input 2 is reserved for remote time enable.

5.1 3PH PUMP TRIP INDICATION FOR VANTAGE® EV SYSTEMS



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 26 - Typical 3ph Pump Trip Indication External Wiring Diagram

5.1.1 Details of Operation

The pump trip wiring diagram shown above refers to the VANTAGE® EV system configurations. An overload with normally open contacts is required. A typical IEC contactor and overload is shown on *Page 25, Section 5.1, Figure 26*.

NOTE: Pump trip indication is not available for CORAYVAC®.

If pump trip occurs, the zone display on the controller will show HEATER LOCKOUT on the status screen. Indication will show that the overload has tripped.

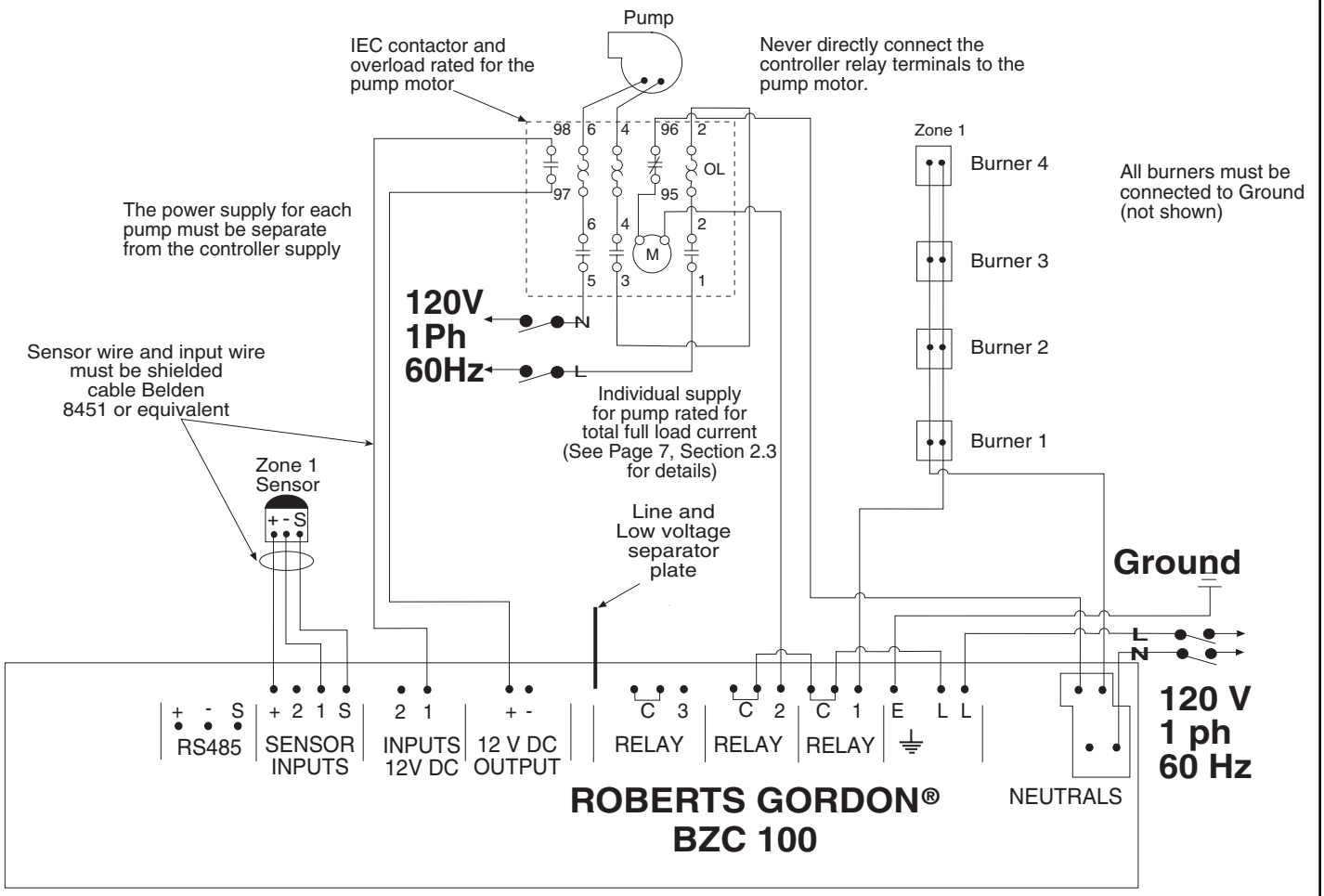
5.1.2 Further Information

The overload must be manually reset. Check and adjust the overload if required, refer to *Page 7, Section 2.3* for settings.

If problems persist, refer to the troubleshooting guide in the Installation, Operation and Service manual supplied with the heating equipment.

If any step is unclear, please contact your ROBERTS GORDON® independent distributor or Roberts-Gordon at (716) 852-4400 or (800) 828-7450 in the U.S., (905) 945-5403 in Canada or at www.rg-inc.com.

5.2 1PH PUMP TRIP INDICATION FOR VANTAGE® EV SYSTEMS



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 27 - Typical 1ph Pump Trip Indication External Wiring Diagram

5.2.1 Details of Operation

The pump trip wiring diagram shown above refers to VANTAGE® EV system configurations. An overload with normally open contacts is required. A typical IEC contactor and overload is shown on *Page 26, Section 5.2, Figure 27*.

NOTE: Pump trip indication is not available for CORAYVAC®.

If pump trip occurs, the zone display on the controller will show HEATER LOCKOUT on the status screen. Indication will show that the overload has tripped.

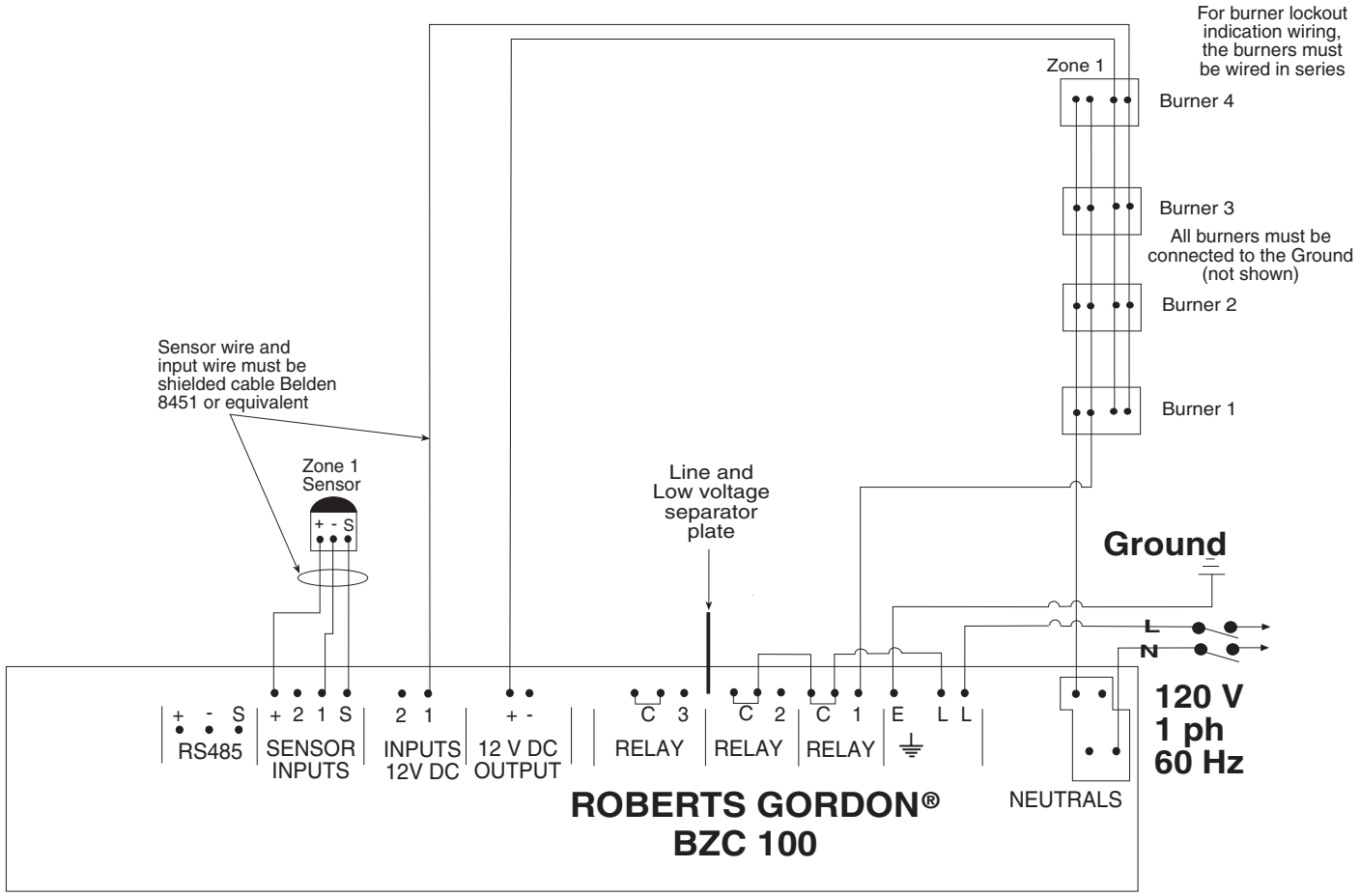
5.2.2 Further Information

The overload must be manually reset. Check and adjust the overload if required, refer to *Page 7, Section 2.3* for settings.

If problems persist, refer to the troubleshooting guide in the Installation, Operation, and Service manual supplied with the heating equipment.

If any step is unclear, please contact your ROBERTS GORDON® independent distributor or Roberts-Gordon at (716) 852-4400 or (800) 828-7450 in the U.S., (905) 945-5403 in Canada or at www.rg-inc.com.

5.3 BURNER LOCKOUT INDICATION FOR UNITARY BURNERS



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 28 -Typical Burner Lockout Indication External Wiring Diagram

5.3.1 Details of External Wiring Diagram

The burner lockout indication wiring diagram shown above refers to configuration with unitary burners. For this option, lockout indication wiring to the burners must be done in series.

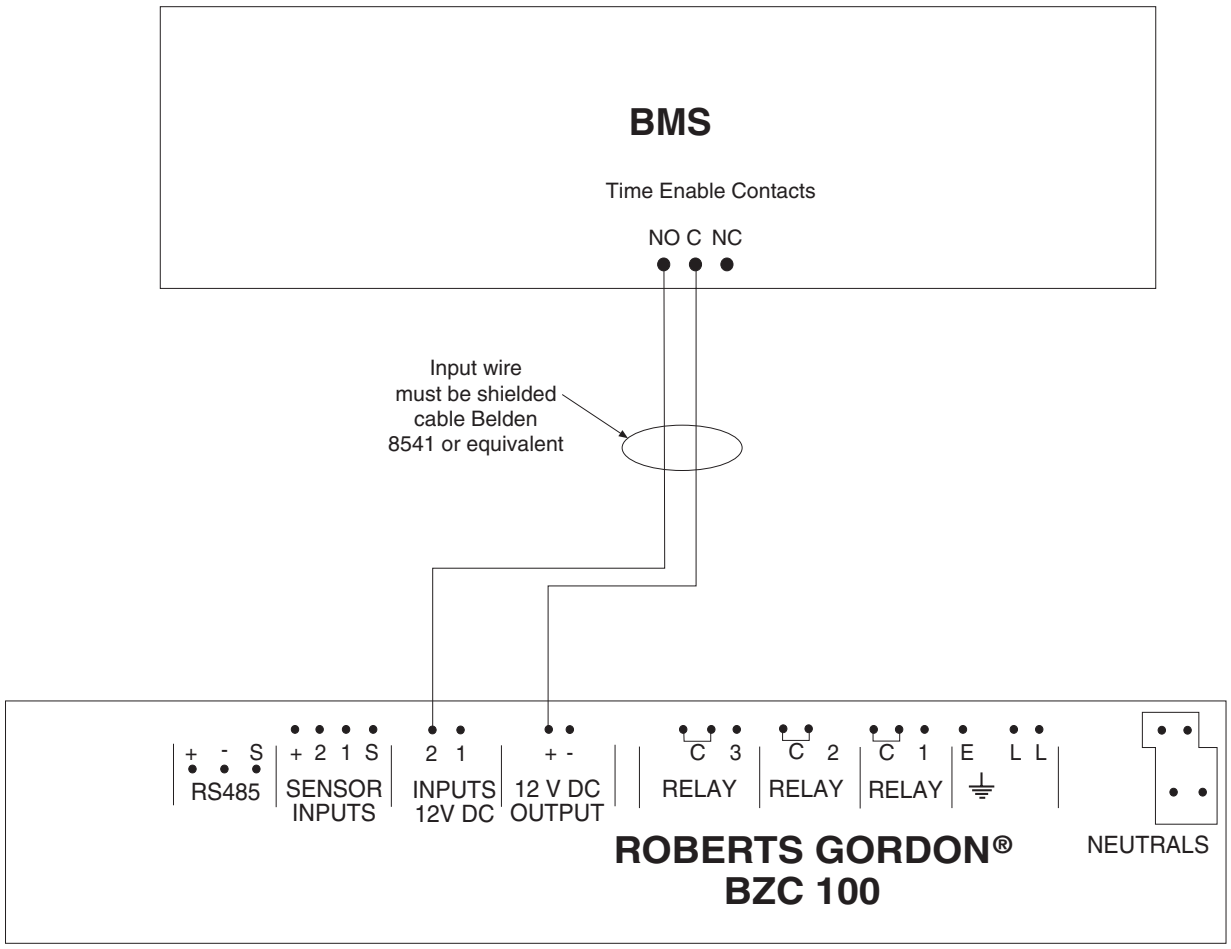
Burner lockout indication wiring into 12V DC inputs should be done as follows:

- Burner lockout input wire for zone 1 goes into 12V DC Input 1, see *Page 27, Figure 28*.
- Burner lockout indication is not available with CORAYVAC® on the ROBERTS GORDON® BZC 100 controller.

5.3.2 Details of Operation

If burner lockout occurs, the zone display of the controller will show LOCKOUT followed by the zone number on the status screen.

5.4 BUILDING MANAGEMENT SYSTEMS REMOTE TIME ENABLE



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 29 - Typical Remote Enable External Wiring Diagram

The BMS time enable diagram shown above is a facility available as an option on the ROBERTS GORDON® BZC 100 Controller.

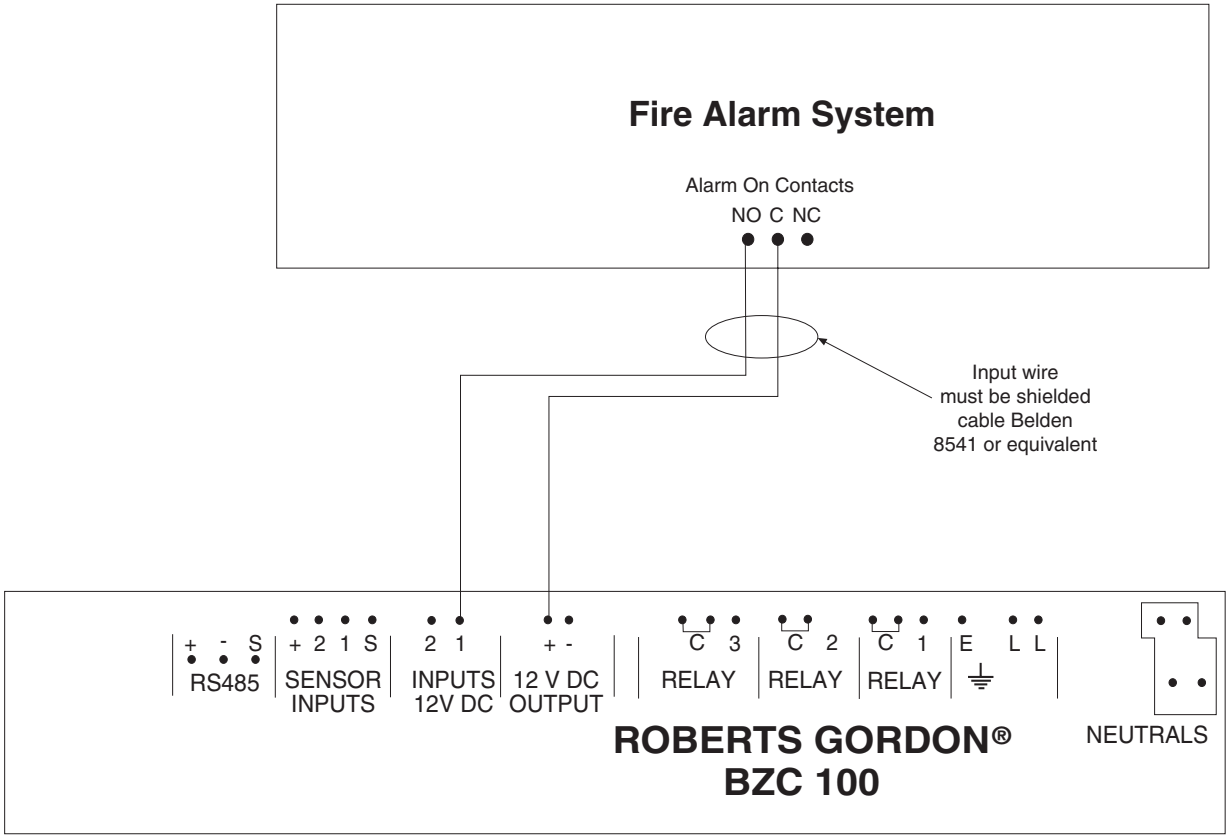
5.4.1 Further Information

The enable facility is only available on input 2. If it is required for your application, it is pre-configured by Roberts-Gordon or a ROBERTS GORDON® independent distributor prior to shipping. The time enable will give a time on signal when the contacts are closed.

The time enable signal will affect all zones where switching times have not been programmed into the controller.

When the BMS time enable is activated, the lower line of the status screen on the controller will display ‘D,’ indicating a day period in the zone.

5.5 FIRE SAFETY SHUT OFF FACILITY



NOTE: TYPICAL LAYOUT DRAWINGS TO BE USED IN CONJUNCTION WITH FACTORY CONFIGURATION SETTINGS - *PAGE 6, SECTION 1.9*

FIGURE 30 - Fire Safety Shut Off External Wiring Diagram

The fire safety shut off diagram shown above is a facility available as an option on the ROBERTS GORDON® BZC 100 Controller.

5.5.1 Further Information

The fire safety shut off facility is only available on input 1. If it is required for your application, it is pre-configured by Roberts-Gordon or a ROBERTS GORDON® independent distributor prior to shipping.

The fire safety shut off signal will immediately disable the heating zone. When the fire alarm is reset (contacts restored to the normally open position), the heating equipment will attempt to resume normal operation.

When the fire safety shut off is activated, the controller changes the set point temperature to ‘00’ for the zone.

▶SECTION 6: ENGINEER'S SET UP

IMPORTANT: BEFORE PROGRAMMING, READ THIS SECTION

Check that the controller has been configured for the specific installation. See *Page 34, Section 6.5* and compare the settings to the configuration sheet on *Page 6, Section 1.9.* If the controller has not been configured or has been configured incorrectly, do not program the controller. Configuring the controller will erase all the previously input settings and restore the defaults.

If the configuration is not correct, contact your ROBERTS GORDON® independent distributor or Roberts-Gordon.

If any step is unclear, please contact your ROBERTS GORDON® independent distributor or Roberts-Gordon at (716) 852-4400 or (800) 828-7450 in the U.S., (905) 945-5403 in Canada or at www.rg-inc.com.

The temperature units of measure can be selected as Fahrenheit or Centigrade. The setting for temperature units of measure will be found in the configuration settings. See *Page 34, Section 6.5* to view the settings. The display of temperature on the screens in the following programming instructions is in Fahrenheit.

The following section describes the procedure for setting up the controller. For operating instructions, please consult the ROBERTS GORDON® BZC 100 Controller Operation Manual.

6.1 CORRECTING WRONG ENTRIES

6.1.1 If a wrong entry is made during the programming sequence, continue following the instructions until the prompt returns to the menu.

6.1.2 The entry can be corrected by repeating the programming sequence from the beginning.

6.1.3 Skip each correct screen by pressing ENTER.

6.1.4 When the incorrect entry is reached, type in the correct entry and press ENTER. Continue pressing ENTER to skip any following correct screens until the screen prompts you to return to the menu screen.

6.2 CHECK THE TIME AND DATE ON THE STATUS SCREEN

6.2.1 Using the SCROLL key, scroll through the display screens until the status screen is displayed.

```
FRI          12 - 10 - 10
14.15.32          N
```

If the time and date displayed are incorrect, follow the sequence below to alter them.

6.2.2 Press PROG.
Enter code 0000 ENTER.
Select 2 Time.

6.2.3 The screen will be similar to below, requesting the selection of the correct date format.

```
DATE?          d-m-y <00>
m-d-y <01>                :00
```

Type 01 and press ENTER here to change the date format to month/day/year. Alternately, pressing ENTER here will leave the date format set as the default day/month/year.

6.2.4 The screen will now show:

```
TIME IS       : 14: 15
NEW TIME      :
```

Enter a new time in (Hours: Minutes) in 24 hour clock notation.
Mistakes may be rectified by pressing DEL. Press ENTER when new time is correct.

6.2.5 The screen will now show:

```
DATE IS       : 12 - 10 - 10
NEW ONE       :    -    -
```

Dates must be entered in the format selected. See *Page 30, Section 6.2.3*. Press ENTER when correct. The option will now be given to set the day.

6.2.6 The screen will now show:

```
ENTER DAY  01 = MON
07 = SUN             : 01
```

Enter the number for the current day. Press ENTER when correct and the display will return to the Set-Up Menu.

6.2.7 Return to Normal (Run) Mode by pressing RUN.

If any mistakes were made during the programming sequence, see *Page 30, Section 6.1* for corrective action.

6.3 CONTROL SETTINGS

After setting the correct time and date, it is required to enter the control settings. Before altering calabration settings, scroll through zone information screens for the zone and note the zone temperature sensed by the controller.

6.3.1 Press PROG.
Enter code 1805 ENTER.
Select 1 Data.

6.3.2 Sensor Calibration

The screen will now show:

CALIBRATION	NO.1
SETTING	:00

Each individual ROBERTS GORDON® BZC sensor needs to be calibrated after installation.

6.3.3 First take the temperature reading from zone 1 using an accurate air temperature thermometer. Hold the temperature sensing probe close to the sensor. Once the temperature has settled, note the result.

6.3.4 Back at the controller, enter the number corresponding to the error recorded to change the current temperature setting. The sensed temperature will adjust by 1 degree in Fahrenheit for each increment of change (if the units of measure are Centigrade the change will be in ½ degree increments.)

After altering, allow 5 seconds for the reading to settle before making further alterations.

For example, if the measured temperature in zone 1 was 65°F and the displayed temperature was 61°F. The calibration setting entered should be :04. The current temperature will now display 65°F.

NOTE: If the reading is showing 'NC', this means that the sensor is faulty or not connected. See *Page 35, Section 7.2* for troubleshooting instructions.

6.3.5 Press ENTER.

6.3.6 Maximum Override Adjustments

The screen will now show:

ENTER MAXIMUM
OVERRIDE :08

Unless instructed otherwise by the building owner, leave at default by pressing ENTER.

The override is the maximum number of hours that the override button can be made to work. Setting this at 00 will disable the override button completely.

6.3.6 The screen will now show:

ENTER UPPER TEMP
OFFSET LIMIT : 05

Unless instructed otherwise by the building owner, leave at default 5°F or 2°C by pressing ENTER.

This is the number of degrees that the user will be able to increase the set point using the UP ARROW in Normal (Run) Mode.

6.3.7 The screen will now show:

ENTER LOWER TEMP
OFFSET LIMIT : 18

Unless instructed otherwise by the building owner, leave at default 18°F or 5°C by pressing ENTER.

This is the number of degrees that the user will be able to decrease the set point using the DOWN ARROW in Normal (Run) Mode.

You will now be asked for the zone you want to alter. If any of the zones are configured for HILO operation, proceed to 6.3.10. Otherwise proceed to 6.3.8 below.

6.3.8 Press RUN to return you to the menu option. Return to Normal (Run) Mode by pressing RUN.

If any mistakes were made during the programming sequence, see *Page 30, Section 6.1* for corrective action.

The following settings are optional, the operating time and temperatures may be input if known.

6.3.9 GORDONRAY® DF ONLY

If you are at the Normal (Run) Mode, repeat steps 6.3.1 to 6.3.7 until the entry of a zone number is requested.

6.3.10 Enter the zone number of the GORDONRAY® DF.

6.3.11 The screen will now show:

ENTER THE HI-LO
DIFFERENCE : **04**

Unless instructed otherwise by the building owner, type 04 and press ENTER.

6.3.12 Press Enter until the display requests the entry of switching times. Press RUN to return you to the menu option. Return to Normal (Run) Mode by pressing RUN.

If any mistakes were made during the programming sequence, see *Page 30, Section 6.1* for corrective action.

6.4 ZONE TIME AND TEMPERATURE SETTINGS

The factory defaults are as follows:
Temperature Settings

Day Temperature	68°F or 20°C
Night Temperature	58°F or 4°C
Time Settings	NONE
Switching Times	NONE

If Remote Time Enable is to be used, leave all switching periods set to the default.

6.4.1 To alter the factory default settings, follow the instructions below.

Press PROG.
Enter code 0000 ENTER.
Select 1 Data.

6.4.2 The screen will now show:

```
ENTER REQUIRED
DAY TEMP      :68
```

Press 2 digits for the required DAY temperature and then press ENTER.

6.4.3 The screen will now show:

```
ENTER REQUIRED
NIGHT TEMP    :58
```

Press 2 digits for the required NIGHT temperature and then press ENTER.

6.4.4 The screen will now show:

```
DAY PERIOD 1 MON
S: 00.00    E: 00.00
```

Enter required switching times for Monday period 1.

There are 4 switching periods per day for each individual zone.

6.4.5 The following example allows for one switching period per day.

Monday to Friday	START 08.00	END17.00
Saturday	START 08.00	END12.00
Sunday	NO SWITCHING PERIOD	

Enter start time 0800.

Use 24 hour clock notation for the start and end times of DAY TEMPERATURE (mistakes may be rectified by pressing DEL) and then press ENTER.

When entering a start time, it is not necessary to allow a warm-up period prior to the start of the required day temperature. This is automatically calculated by the controller giving the required temperature at the time set.

The screen will now show:

```
DAY PERIOD 1 MON
S: 08.00    E: 00.00
```

Enter end time 1700. Press Enter

```
DAY PERIOD 1 MON
S: 08.00    E: 17.00
```

The screen will now show:

```
DAY PERIOD 2 MON
S: 00.00    E: 00.00
```

Press ENTER, to skip without altering the setting.

The reason for leaving the start and end times 00.00 is because in this example we are only using one switching period per day.

Repeat as above for periods 3 and 4 for Monday. The screen will now show:

```
DAY PERIOD 1 TUE
S: 00.00    E: 00.00
```

Pressing the PROG key at this point will copy all of Monday's switching times to Tuesday.

The screen will now show:

```
DAY PERIOD 1 WED
S: 00.00    E: 00.00
```

Pressing the PROG key at this point will copy the times from Tuesday to Wednesday. Repeat this for Thursday and Friday.

The screen will now show:

```
DAY PERIOD 1 SAT
S: 00.00    E: 00.00
```

For Saturday, the switching period is different from the weekday settings. The new settings must be entered.

Enter start time 0800. Enter end time 1200. Press ENTER.

DAY PERIOD 1 SAT
S: 08.00 E: **12.00**

Leave the start and end times blank for periods 2, 3 and 4 because in this example we are only using one switching period on Saturday.

As no switching times are required for Sunday, press RUN to save the settings and return to the menu.

The process described above must now be repeated for each heating zone within the building.

Press RUN to return to the Normal (Run) Mode from the menu.

If any mistakes were made during the programming sequence, see *Page 30, Section 6.1* for corrective action.

6.5 HOW TO CHECK THE CONFIGURATION OF THE ROBERTS GORDON® BZC 100 CONTROLLER

The individual configuration can be verified for the control by following the steps described below. This is advised where multiple panels are installed on one site.

Press PROG.
Enter code 1805.
Select 4 C.LOG.

You will then be given the following options:

```
1) CLEAR MONITOR
2) VIEW CONFIG
```

Select 2 to view the original configuration settings pre-programmed into the controller. The screens displayed will be similar to those below:

```
Z1  1) U   2) CF   3) HL
4) CRV  5) URV      :02
```

The above screen indicates that zone 1 is selected as a VANTAGE® EV or Common Fan System. For VANTAGE® EV and CORAYVAC®, there is a further screen to designate the pump outputs.

If the display had shown :01 UNIT (unitary refers to GORDONRAY® BH, VANTAGE® II, VANTAGE® HE, VANTAGE® TF or CARIBE®).

```
FAN NUMBER FOR
ZONE 1?          :01
```

The above screen indicates that the pump output selected for the pump is relay 3. (See *Page 6, Section 1.9* for relay assignments.)

NOTE: In the case of CORAYVAC®, the input is used for the pressure switch proving facility. It is not used for the VANTAGE® EV system.

After scrolling through the zone configuration screens, the following screen will be displayed:

```
IN1? LOCKOUT (00)
 FIRE OFF (01)  :01
```

The screen displayed above indicates that fire safety shut off has been selected for this controller. This means that input 1 is already assigned. Press ENTER to proceed to the next screen.

```
TEMP UNITS?
C (00) F (01)   :01
```

The above screen indicates the units of measure selected for temperature indication for the controller. This setting will effect all default temperatures. Pressing ENTER will take you back to the setup menu.

Press RUN to return to the Normal (Run) Mode from the menu.

▶SECTION 7: TROUBLESHOOTING

IMPORTANT:

Troubleshooting only to be carried out by an electrician qualified in the installation of control systems for heating equipment.

Use *Page 6, Section 1.9* of the original manual supplied with this controller to identify the configuration.

If this is not available, use *Page 34, Section 6.5* to view the configuration on the screen.

The troubleshooting section of this manual is divided into sections to make fault identification and rectification easy to complete.

7.1 DISPLAY PROBLEMS

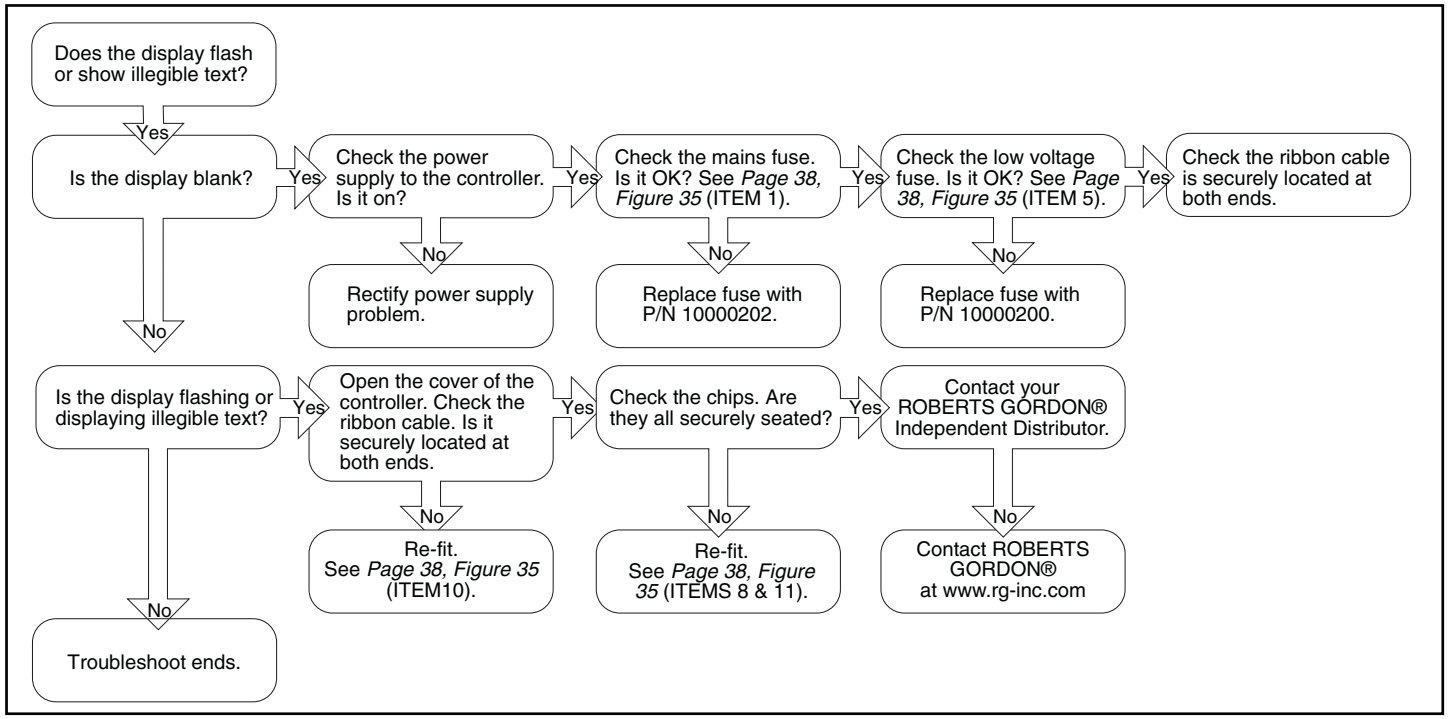

Does the display flash or show illegible text?
Yes
Is the display blank?
Yes
Check the power supply to the controller. Is it on?
Yes
Check the mains fuse. Is it OK? See *Page 38, Figure 35* (ITEM 1).
Yes
Check the low voltage fuse. Is it OK? See *Page 38, Figure 35* (ITEM 5).
Yes
Check the ribbon cable is securely located at both ends.
No
Rectify power supply problem.
No
Replace fuse with P/N 10000202.
No
Replace fuse with P/N 10000200.
No
Is the display flashing or displaying illegible text?
Yes
Open the cover of the controller. Check the ribbon cable. Is it securely located at both ends.
Yes
Check the chips. Are they all securely seated?
Yes
Contact your ROBERTS GORDON® Independent Distributor.
No
Re-fit. See *Page 38, Figure 35* (ITEM10).
No
Re-fit. See *Page 38, Figure 35* (ITEMS 8 & 11).
No
Contact ROBERTS GORDON® at www.rg-inc.com
No
Troubleshoot ends.

FIGURE 31 - Display Troubleshooting Diagram

7.2 SENSOR PROBLEMS

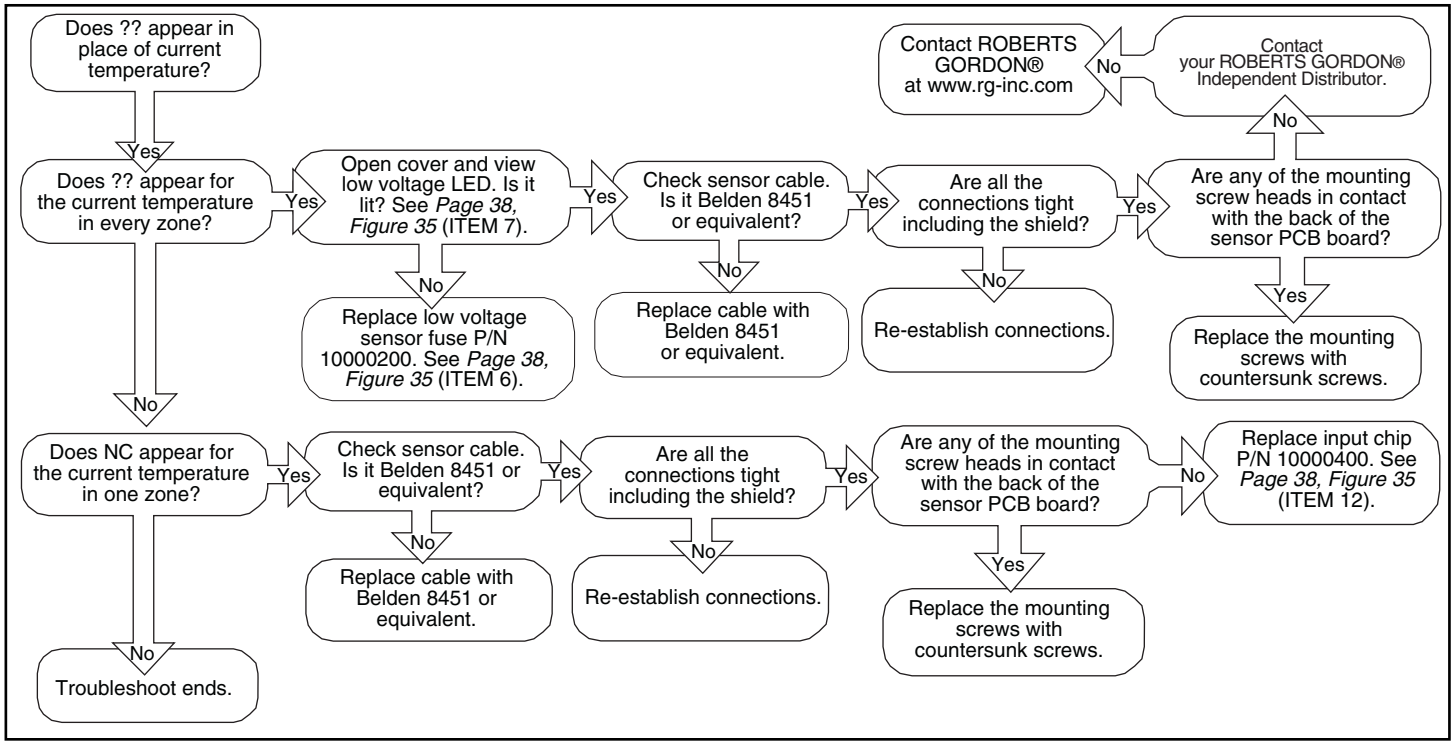

Does ?? appear in place of current temperature?
Yes
Does ?? appear for the current temperature in every zone?
Yes
Open cover and view low voltage LED. Is it lit? See *Page 38, Figure 35* (ITEM 7).
Yes
Check sensor cable. Is it Belden 8451 or equivalent?
Yes
Are all the connections tight including the shield?
Yes
Are any of the mounting screw heads in contact with the back of the sensor PCB board?
No
Contact your ROBERTS GORDON® Independent Distributor.
No
Contact ROBERTS GORDON® at www.rg-inc.com
No
Replace low voltage sensor fuse P/N 10000200. See *Page 38, Figure 35* (ITEM 6).
No
Replace cable with Belden 8451 or equivalent.
No
Re-establish connections.
Yes
Replace the mounting screws with countersunk screws.
No
Does NC appear for the current temperature in one zone?
Yes
Check sensor cable. Is it Belden 8451 or equivalent?
Yes
Are all the connections tight including the shield?
Yes
Are any of the mounting screw heads in contact with the back of the sensor PCB board?
No
Replace input chip P/N 10000400. See *Page 38, Figure 35* (ITEM 12).
No
Replace cable with Belden 8451 or equivalent.
No
Re-establish connections.
Yes
Replace the mounting screws with countersunk screws.
No
Troubleshoot ends.

FIGURE 32 - Sensor Troubleshooting Diagram

7.3 UNITARY BURNERS

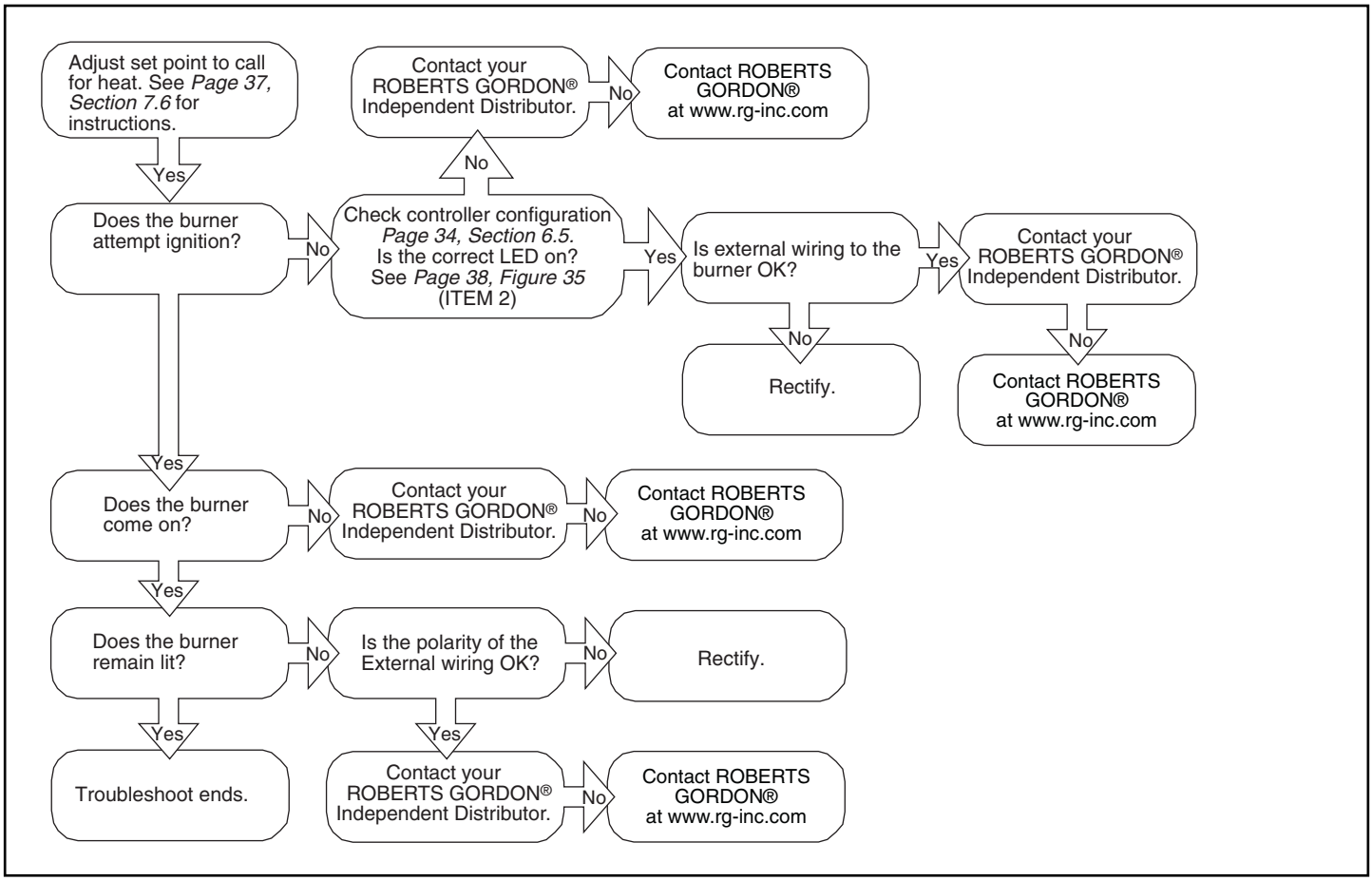


FIGURE 33 - Unitary Troubleshooting Diagram

7.4 TROUBLESHOOTING VARIATIONS FOR VANTAGE® EV SYSTEMS.

If there is power from the panel to energize the starter but the fan fails to run, check the overload setting at the local starter. Refer to *Page 7, Section 2.3* for details.

7.5 CORAYVAC® SYSTEMS

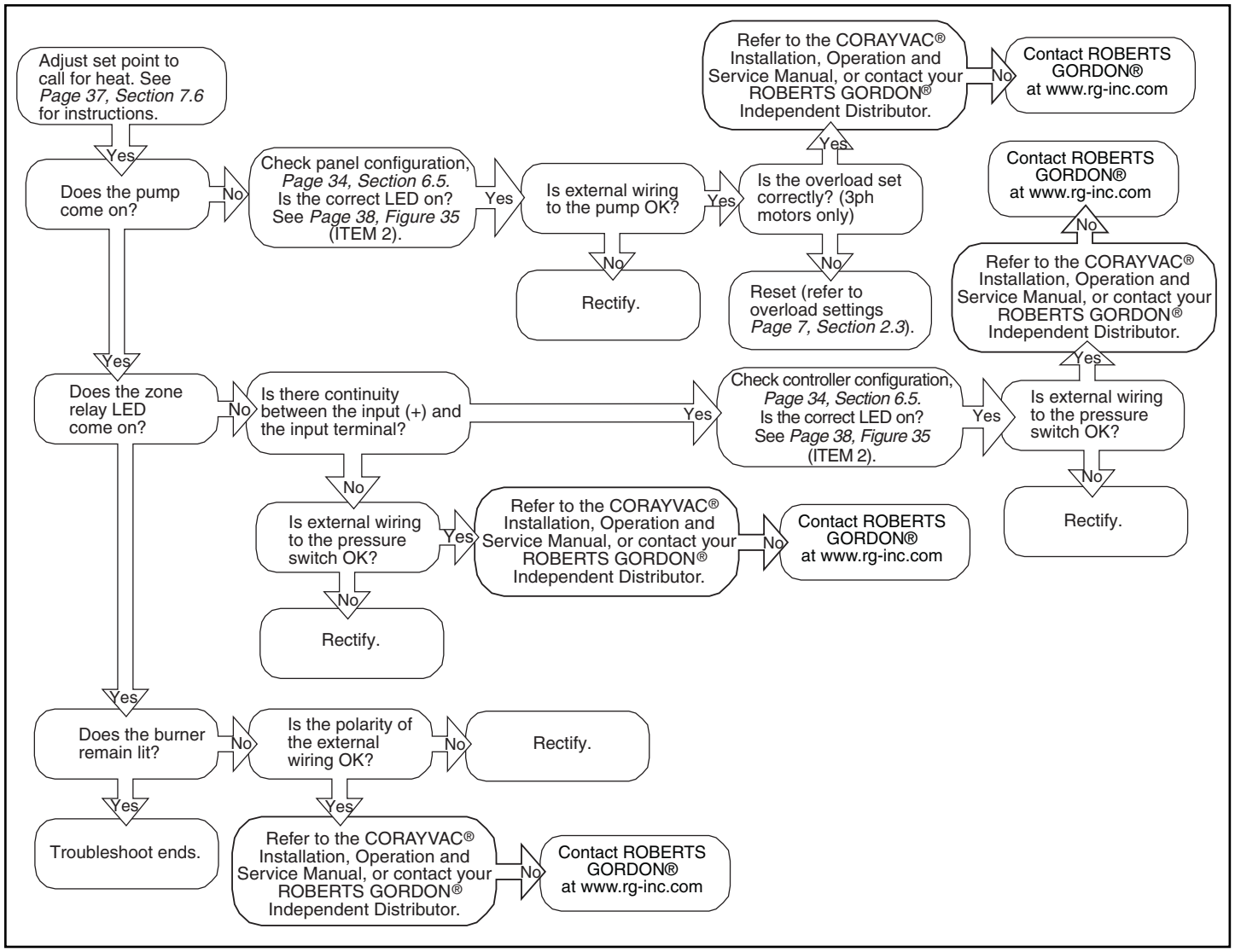

Adjust set point to call for heat. See Page 37, Section 7.6 for instructions.
Does the pump come on?
Check panel configuration, Page 34, Section 6.5. Is the correct LED on? See Page 38, Figure 35 (ITEM 2).
Is external wiring to the pump OK?
Is the overload set correctly? (3ph motors only)
Refer to the CORAYVAC® Installation, Operation and Service Manual, or contact your ROBERTS GORDON® Independent Distributor.
Contact ROBERTS GORDON® at www.rg-inc.com
Rectify.
Reset (refer to overload settings Page 7, Section 2.3).
Does the zone relay LED come on?
Is there continuity between the input (+) and the input terminal?
Check controller configuration, Page 34, Section 6.5. Is the correct LED on? See Page 38, Figure 35 (ITEM 2).
Is external wiring to the pressure switch OK?
Rectify.
Is external wiring to the pressure switch OK?
Refer to the CORAYVAC® Installation, Operation and Service Manual, or contact your ROBERTS GORDON® Independent Distributor.
Contact ROBERTS GORDON® at www.rg-inc.com
Rectify.
Does the burner remain lit?
Is the polarity of the external wiring OK?
Rectify.
Troubleshoot ends.
Refer to the CORAYVAC® Installation, Operation and Service Manual, or contact your ROBERTS GORDON® Independent Distributor.
Contact ROBERTS GORDON® at www.rg-inc.com
Yes
No

FIGURE 34 - CORAYVAC® Troubleshooting Diagram

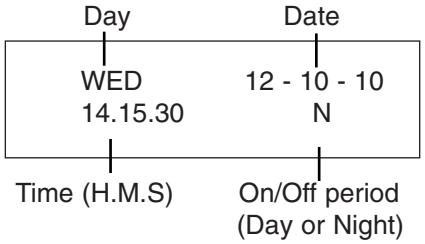
7.6 SCREEN DISPLAYS

In Normal (Run) Mode, the following options are available without the entry of a security code:

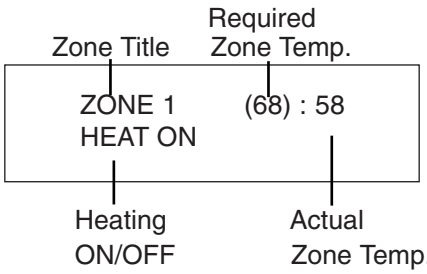
INFORMATION SCREENS

Pressing the SCROLL key will enable you to scroll. The following screens will be displayed between the status and zone information screens.

STATUS



ZONE INFORMATION



To manually bring on the zone, scroll to the zone information screen above and use the UP(3) and DOWN(7) arrow keys to adjust the set point.

▶SECTION 8: REPLACEMENT PARTS

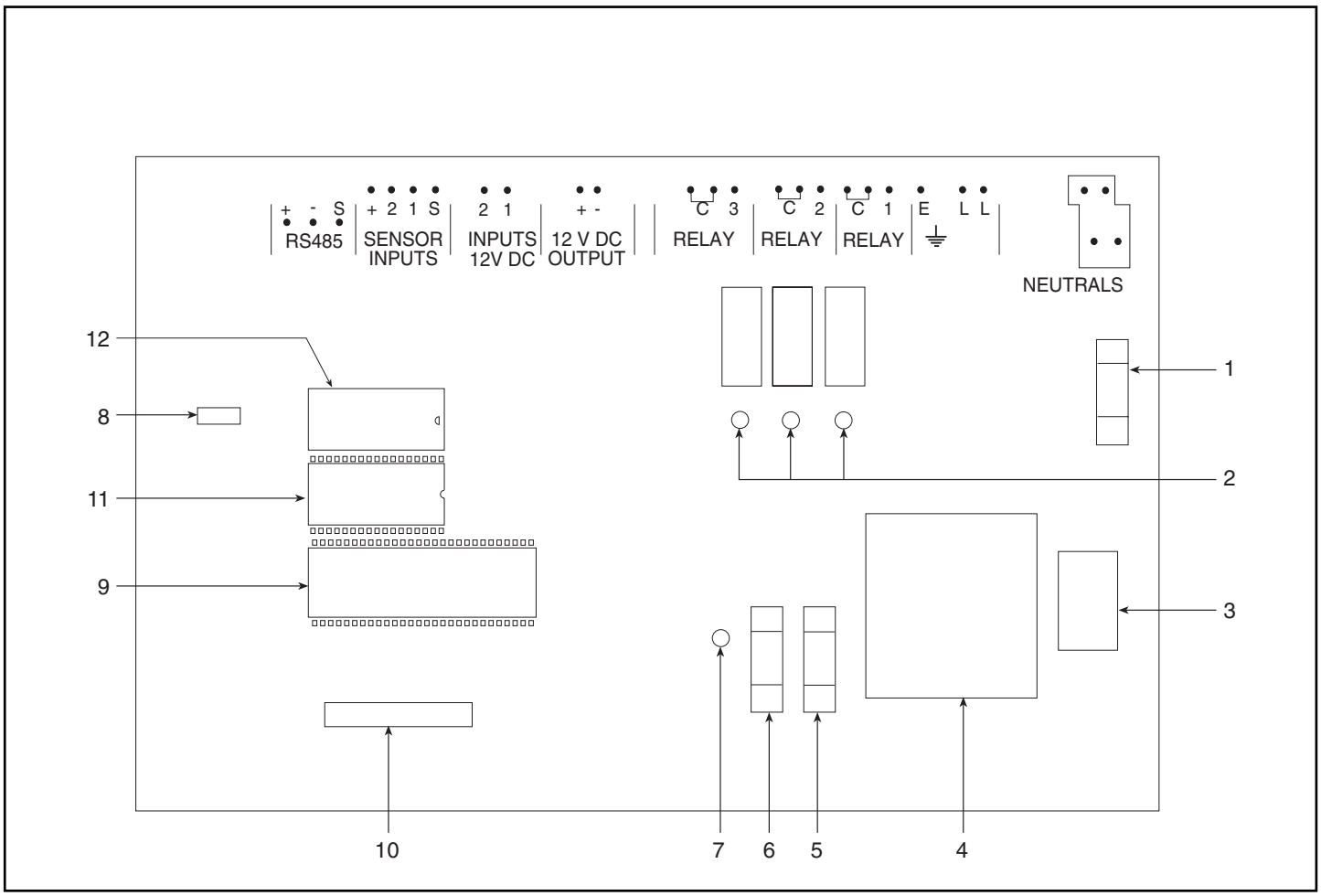


FIGURE 35 - ROBERTS GORDON® BZC 100 Internal Components Diagram

8.1 COMPONENT LIST

	P/N	Description
1.	10000202	ANTISURGE FUSE 500mA
2.	NA	LED RELAY STATUS
3.	NA	VOLTAGE SELECTOR SWITCH
4.	NA	TRANSFORMER 12V DC
5.	10000200	FUSE FASTBLOW (BOARD) 315mA
6.	10000200	FASTBLOW FUSE (SENSOR) 315mA
7.	NA	LOW VOLTAGE LED INDICATION
8.	10000300	BZC TIMEKEEPER M48T02
9.	NA	PROCESSOR CHIP
10.	NA	RIBBON CABLE SOCKET
11.	10012300	BZC EPROM 100
12.	10000400	BZC INPUT CHIP 16 PIN PC815
13.	10000702	CABLE ENTRY PLATE *NOT SHOWN*
14.	10000703	CLIP COVER AND SCREW (4 PACK) *NOT SHOWN*
15.	10000401	BZC INPUT CHIP 8 PIN PC815

⚠ WARNING

Use only genuine ROBERTS GORDON ® replacement parts.

Use of parts not specified by Roberts-Gordon voids warranty.

Failure to follow these instructions can result in death, injury or property damage.

8.2 REPLACEMENT PARTS INSTRUCTIONS

8.2.1

⚠ WARNING

Electrical Shock Hazard

Disconnect electrical power before servicing.

Replace door before operating.

Failure to follow these instructions can result in death or electrical shock.

10000202 AntiSurge Fuse 500mA

250V fuse protects the controller from power surges, lightning and incorrect wiring.

If the mains fuse needs replacing, the following steps must be taken.

Turn off the power to the controller.

Remove the clips and screws from the cover panel and remove the cover of the controller.

Disconnect the ribbon cable from the main board only, leaving the ribbon attached to the cover.

Locate the fuse on *Page 38, Figure 35* (ITEM 1), and remove the fuse with a fuse pulling tool.

Replace with a new fuse rated at 500mA Anti Surge.

Reconnect the ribbon cable to the main board and replace the cover of the controller by replacing the four securing screws and the four clips.

8.2.2 LED Relay Status

There are 3 status LEDs on the board; one for each relay. When the relays are energized, the appropriate LED will be lit.

8.2.3 Voltage Selector Switch

The voltage selector switch has 2 settings; 115 for 120V supply, 230 for 230V 1ph supply. This switch must be set to 115 for use in North America.

8.2.4 Transformer

The transformer on the board cannot be replaced.

8.2.5 10000200 FastBlow Fuse (Board) 315mA

This low voltage fuse protects the controller circuit board.

If the low voltage fuse needs replacing, the following steps must be taken.

Turn off the power to the controller.

Remove the clips and screws from the cover panel and remove the cover of the controller.

Disconnect the ribbon cable from the main board only, leaving the ribbon attached to the cover.

Locate the fuse on *Page 38, Figure 35 (ITEM 5),* and remove the fuse with a fuse pulling tool.

Replace with a new fuse rated at 315mA quick blow.

Reconnect the ribbon cable to the main board and replace the cover of the controller by replacing the four securing screws and the four clips.

8.2.6 10000200 FastBlow Fuse (Sensor) 315mA

This low voltage fuse protects the sensors connected to the controller circuit board.

If the low voltage fuse needs replacing, the following steps must be taken.

Turn off the power to the controller.

Remove the clips and screws from the cover panel and remove the cover of the controller.

Disconnect the ribbon cable from the main board only, leaving the ribbon attached to the cover.

Locate the fuse on *Page 38, Figure 35* (ITEM 6), and remove the fuse with a fuse pulling tool.

Replace with a new fuse rated at 315mA quick blow.

Reconnect the ribbon cable to the main board and replace the cover of the controller by replacing the four securing screws and the four clips.

8.2.7 Low Voltage LED

The LED is linked to the 12V DC output which supplies the sensors with power.

If the LED is not lit, there will be no 12V DC output resulting in the loss of sensor readings.

If this is the case, the low voltage fuse protecting the sensors *Page 38, Figure 35* (ITEM 6), will need replacing.

8.2.8 10000300 Timekeeper MT48T02

The timekeeper is where the controller's settings are stored.

If the need arises that you have to take out the timekeeper, the following steps must be taken.

Turn off the power to the controller.

Remove the clips and screws from the cover panel and remove the cover of the controller.

Disconnect the ribbon cable from the main board only, leaving the ribbon attached to the cover.

Locate the timekeeper on *Page 38, Figure 35,* (ITEM 8) and with a small terminal screw driver placed underneath the device, pry the timekeeper out of the socket.

To fit a new timekeeper:

See *Page 38, Figure 35* (ITEM 8), *there is* a notch on the socket and the timekeeper. The timekeeper should be fit so that the notch on the socket and the timekeeper are aligned.

Reconnect the ribbon cable to the main board and replace the cover of the controller by replacing the four securing screws and the four clips.

8.2.9 Processor Chip

The processor is the brains behind the controller. The processor is not serviceable.

8.2.10 Ribbon Cable Socket

The cover of the controller is connected to the main circuit board by means of a ribbon cable. When servicing the controller, you will need to disconnect the ribbon cable.

Do this by simply pulling the connector from the socket highlighted above.

It is imperative that the ribbon cable is connected properly before powering up the controller.

To do this, simply ensure both ends (the cover and the main board) have been firmly pushed into the sockets.

The ribbon cable can be connected to the controller one way.

8.2.10 10012300 BZC Eprom 100

The Eprom is where the controller's program (not settings) is stored.
To take out the Eprom. The following steps must be taken.

Turn off the power to the controller.

Remove the clips and screws from the cover panel and remove the cover of the controller.

Disconnect the ribbon cable from the main board only, leaving the ribbon attached to the cover.

Locate the Eprom on *Page 38, Figure 35,* (ITEM 11) and with a small terminal screw driver placed underneath the device, pry the Eprom out of the socket.

To fit a new Eprom:

First, look at the Eprom you are about to fit. You will see a notch on one end of the Eprom.

See *Page 38, Figure 35,* (ITEM 11).There is a notch on the socket and a notch on the timekeeper. The Eprom should be fit so that the notch on the socket and the timekeeper are aligned.

Reconnect the ribbon cable to the main board and replace the cover of the controller by replacing the four securing screws and the four clips.

8.2.11 10000400 ROBERTS GORDON® BZC Input Chip 16 Pin PC815

The input chip enables the controller to communicate with the sensors and 12V DC inputs.

To remove the input chip, the following steps must be taken.

Turn off the power to the controller.

Remove the clips and screws from the cover panel and remove the cover of the controller.

Disconnect the ribbon cable from the main board only, leaving the ribbon attached to the cover.

Locate the input chip from *Page 38, Figure 35,* (ITEM 12) and with a small terminal screw driver placed underneath the device, pry the input chip out of the socket.

To fit a new input chip:

Carefully insert the chip orientating it the same as the original chip was.

Reconnect the ribbon cable to the main board and replace the cover of the controller by replacing the four securing screws and the four clips.

8.2.12 10000702 Cable Entry Plate
Not shown.

8.2.13 10000703 Clip Cover and Screw (4 pack)
Not shown.

8.2.14 10000401 ROBERTS GORDON® BZC Input Chip 8 Pin PC815

The input chip enables the controller to communicate with the sensors and 12V DC inputs.

To remove the input chip, the following steps must be taken.

Turn off the power to the controller.

Remove the clips and screws from the cover panel and remove the cover of the controller.

Disconnect the ribbon cable from the main board only, leaving the ribbon attached to the cover.

Locate the input chip from *Page 38, Figure 35,* (ITEM 15) and with a small terminal screw driver placed underneath the device, pry the input chip out of the socket.

To fit a new input chip:

Carefully insert the chip orientating it the same as the original chip was.

Reconnect the ribbon cable to the main board and replace the cover of the controller by replacing the four securing screws and the four clips.

▶SECTION 9: THE ROBERTS GORDON® BZC 100 CONTROLLER WARRANTY

ROBERTS-GORDON WILL PAY FOR:

For 36 months from the date of purchase by the original consumer or 42 months from date of shipment by Roberts-Gordon, whichever occurs first: we will provide, free of charge, replacement parts for any part of the ROBERTS GORDON® BZC 100 Controller that fails because of a manufacturing or material defect.

ROBERTS GORDON® replacement parts are warranted for the period of the original ROBERTS GORDON® BZC 100 Controller Warranty.

ROBERTS-GORDON WILL NOT PAY FOR:

Service trips, service calls and labor charges.

Shipment of replacement parts.

Damage due to:

Failure to install, operate or maintain the ROBERTS GORDON® BZC 100 Controller as directed in the Installation and Operation Manuals. You must follow requirements printed in these manuals.

Misuse, abuse, neglect or modification of the ROBERTS GORDON® BZC 100 Controller in any way.

Improper service, use of replacement parts or accessories that are not specified by Roberts-Gordon.

Improper installation, or any relocation of the ROBERTS GORDON® BZC 100 Controller after initial installation.

Incorrect supply, accident, fire, flood, acts of God or other casualty.

Use of the ROBERTS GORDON® BZC 100 Controller for other than its intended purpose.

Use of the ROBERTS GORDON® BZC 100 Controller in a corrosive atmosphere or any atmosphere containing contaminants.

Shipping. Claim must be filed with carrier.

WARRANTY IS VOID IF:

The ROBERTS GORDON® BZC 100 Controller is not installed by a electrician qualified in the installation of control systems for heating equipment.

You cannot prove original purchase date and required annual maintenance history.

The data plate and/or serial number are removed, defaced, modified or altered in any way.

The ROBERTS GORDON® BZC 100 Controller is transferred. This warranty is nontransferable.

Roberts-Gordon is not permitted to inspect the damaged ROBERTS GORDON® BZC 100 Controller and/or component parts.

READ YOUR INSTALLATION MANUAL

If you have questions about your ROBERTS GORDON® BZC 100 Controller, contact your installing professional. Should you need replacement parts or have additional questions, call or write Roberts-Gordon:

U.S.A.
1250 William Street
P.O. Box 44
Buffalo, New York 14240-0044
Telephone: 716.852.4400
Fax: 716.852.0854

Canada
241 South Service Road, West
Grimsby, Ontario L3M 1Y7
Telephone: 905.945.5403
Fax: 905.945.0511

On the web at:
www.rg-inc.com

Roberts-Gordon's liability, and your exclusive remedy, under this warranty or any implied warranty (including the implied warranties of merchantability and fitness for a particular purpose) is limited to providing replacement parts during the term of this warranty. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you. There are no rights, warranties or conditions, expressed or implied, statutory or otherwise, other than those contained in this warranty.

Roberts-Gordon shall in no event be responsible for incidental or consequential damages or incur liability for damages in excess of the amount paid by you for the ROBERTS GORDON® BZC 100 Controller. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so this limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction.

Roberts-Gordon shall not be responsible for failure to perform under the terms of this warranty if caused by circumstances out of its control, including but not limited to fire, flood, strike, government or court orders, unavailability of supplies, parts or power. No person is authorized to assume for Roberts-Gordon any other warranty, obligation or liability.

LIMITATIONS ON AUTHORITY OF REPRESENTATIVES:

No representative of Roberts-Gordon, other than an Executive Officer, has authority to change or extend these provisions. Changes or extensions shall be binding only if confirmed in writing by Roberts-Gordon's duly authorized Executive Officer.